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STRICTURE OF THE RECTUM:

A STUDY OF

NINETY-SIX CASES.

BY

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STRICTURE OF THE RECTUM.

For convenience of study the following classification of the different varieties of stricture of the rectum has been arranged. It is intended to include all the possible forms of the disease.

- Congenital.
  - Complete.
  - Partial.
- Acquired.
  - 1. Spasm.
  - 2. Pressure from without.
  - 3. Non-venereal.
    - *a.* Dysenteric.
    - *b.* Tubercular.
    - *c.* Inflammatory.
    - *d.* Traumatic.
  - 4. Venereal.
    - *a.* Ulceration (either chancroidal, secondary, or tertiary).
    - *b.* Due to unnatural vice.
    - *c.* Neoplastic. (Gummata. Ano-rectal syphiloma.)
  - 5. Cancer.

The first great division is into the congenital and acquired, and the congenital may be subdivided into the complete and partial with practical advantage, inasmuch as the former require immediate relief to prolong life, and the latter may exist for many years without causing fatal results or in some cases even being detected. A more exhaustive description of the several varieties of congenital malformations will be found in my general work on diseases of the rectum.

Of the acquired strictures the rarest is the spasmodic; but of its occasional existence, and almost invariably in association with some other disease, there can no longer be any doubt, though the fact has been questioned for many years. I have never seen it in an otherwise healthy rectum, but I have seen it present to a marked extent once in connection with a slight organic stricture and again with hæmorrhoidal ulceration.

In the latter case it was so marked as to render the introduction of the finger impossible till after the administration of ether, when it entirely disappeared.

Any form of pressure from outside the rectum may be sufficient to occlude it, but generally the pressure will be due either to a cancerous growth or pelvic cellulitis. In one of my cases the pressure of a cancerous mass springing from the promontory of the sacrum first manifested itself by causing complete and almost fatal occlusion. The patient was relieved by a colotomy done in the midst of acute peritonitis with the happiest result. In two other cases the pressure was due to the presence and contraction of old pelvic exudations. One of these was fatal from heart and kidney complications, after an attack of complete obstruction had been overcome by opium and frequent tappings of the distended gut; the other was completely relieved by colotomy.

Non-venereal stricture may be either dysenteric, tubercular, inflammatory, or traumatic.

Dysenteric strictures are not very uncommon in New York, though generally seen in patients coming from warmer climes. As I have seen them they have been severe, the ulceration being extensive, and the cicatricial contraction considerable in amount.

Tubercular ulceration can only be diagnosticated from the general condition and history of the patient, and by examination for the bacilli under the microscope.

Inflammatory stricture, due to the destruction of a considerable amount of peri-rectal tissue by acute inflammation, is rare. That it may occur at any time as the result of a large abscess or extensive sloughing is undoubted.

Any severe form of proctitis resulting in ulceration may be a cause of stricture. Such a proctitis may result from the mechanical effects of a fæcal impaction; from pressure arising from malposition of the uterus; from the erosion and ulceration of hæmorrhoidal tumors; in fact from any irritation sufficiently severe to set up an inflammation which ends in destruction of the mucous membrane.

Traumatic ulceration following operations or wounds of the rectum is not at all infrequent. Any one who has watched the slow cicatrization of a surgical wound of the rectum following an operation for hæmorrhoids or fistula, knows how

easily such a wound when neglected may change into an intractable ulcer and how surely the ulcer may develop into stricture.

The venereal strictures have always been a subject of discussion.

Without assuming too much as generally granted, it may safely be said that beyond dispute there are three forms of well-recognized venereal disease in the rectum which may result in stricture. These are: First, chancroidal, secondary, and tertiary ulcerations of the rectal mucus membrane. Second, ulcerations due to unnatural sexual intercourse, either simply traumatic or the result of direct inoculation. Third, an unusual form of tertiary disease of the general nature of a gummatous deposit variously described by different authors, and by Fournier in a Monograph, as "Ano-rectal syphiloma."

All of these much disputed conditions I think I can say I have myself seen, diagnosticated, and treated.

Last of all we have the all too frequent manifestation of cancer in this part of the body—a disease which we are now beginning to treat with favorable results which a decade ago would have been thought impossible.

Symptoms.

These may be grouped under two heads; those due to ulceration and those due to mechanical obstruction. In the great majority of cases the signs of mechanical obstruction will be preceded by those of the ulceration which has caused it. The symptoms of ulceration of the rectum are pain, and the discharge of bloody pus. The pain is located in the rectum; is of a dull, constant character; and unless the sphincter is involved is not greatly increased by the act of defecation. In addition to this there is generally pain in the back, scrotum, loins, and down the thighs. There is often great sympathetic vesical disturbance, and loss of sexual power. The discharge of blood and pus is quite characteristic. When the disease is of limited extent this occurs only with the stools, when more extensive it fills up the rectum and is passed independently of the fæces. The rectum becomes filled with it during the night and the patient is wakened early in the morning by the desire for an evacuation which results only in the passage of slime and a little black blood.

After an hour or two there is another movement, this time often containing fæces mixed with blood and pus. This may be repeated several times at intervals of an hour or so, and then there may be several hours of rest. In an advanced case the patient is deprived entirely of rest by the persistent discharge; sleep is impossible, and life is passed in a constant effort to keep the rectum free from the irritating discharge.

The bleeding is not generally very profuse, and the patient seldom passes blood alone; the discharge generally consisting of pus and mucus streaked with blood, and occasionally of a little fæcal matter.

In addition to the discharge, the symptoms caused by the mechanical obstruction begin to show themselves after a time. At first there may be only great straining resulting in the passage of small lumps of matter. Later the patient will complain that he never has a passage without taking a cathartic, and that he has adopted the practice of doing this once or twice a week; unloading the bowel first of small pieces of solid matter, and then of a large quantity of semi-solid and liquid fæces. The condition of chronic obstruction with its attendant evils—dilatation of the bowel and intestinal catarrh above the obstruction, with ulceration and thinning of the intestinal wall—is thus insensibly established. One who sees many of these cases of chronic obstruction and knows how dilated and weakened the bowel may become above the stricture will be very cautious in the use of cathartics in this condition.

Acute obstruction may, at any time, be added to the chronic condition; but acute and complete obstruction are comparatively rare in stricture of the rectum; and acute obstruction as the first symptom of the disease without the previous history of ulceration is rarer still. In my own experience I have seen acute complete obstruction supervene upon the chronic condition in but three cases, two ending fatally in rupture of the colon, and the other relieved by opium and aspiration of the distended gut.

Acute obstruction as the first and only symptom of stricture I have seen but once—a case of cancer between the promontory of the sacrum and the rectum occluding the latter by direct pressure. In one other case acute obstruction ended fatally before there were sufficient symptoms of rectal disease

to enable us to make a diagnosis; the patient, a physician, complaining only of pain in the left iliac fossa, and of occasional passages of blood with the fæces. The autopsy revealed an annular cancerous stricture in the sigmoid flexure.

All of these cases illustrate the general rule that complete obstruction is only liable to occur when the stricture is high up, and that it may then occur very early and with very slight premonition. In many old cases near the anus it is surprising to see how many years life will be prolonged with the gut almost completely closed. The explanation is purely a mechanical one—with a stricture high up in the movable portion of the bowel, the force applied in the effort of defecation merely bends the gut upon itself and increases the obstruction by adding a flexure to the stricture. On the other hand, in disease low down, where the rectum is firmly held in place by bony points, all the force of the expulsive movement is brought to bear in a direct line with the orifice, and small, ribbon-like masses of solid fæces are driven through the opening as long as any opening remains. This is the explantion of tape-like stools as a symptom of stricture. They are only seen when the disease is near the anus, and they are often caused by a spasmodic action of the sphincter where there is no organic stricture.

Stricture of the rectum, whether cancerous or benign, left to its own course, ends fatally, either by obstruction or by exhausting the sufferer's powers. After a few years these patients sink into a miserable condition, worn out by constant rectal tenesmus, by chronic inestinal obstruction, and by degeneration of the kidneys. The only attempt at a cure nature is ever known to have made was in the case of Talma, where an intestinal anastomosis was established above and below the disease, and this was not successful in preserving life.

Diagnosis.

The mere diagnosis of the presence of stricture is generally easy, because in the great majority of cases the disease is within reach of the finger by rectal examination, and, when felt, can be mistaken for nothing else.

When, however, a patient complains of the symptoms of ulceration and stricture, and no stricture is found by digital

examination, the problem at once becomes one of the most difficult in physical diagnosis. There is one part of the lower bowel--that part which can be reached neither by the finger in the rectum, nor the hand in the pelvis, nor by both combined—where our means of diagnosis are as yet very uncertain; and in just this part we occasionally, though rarely, find a stricture.

We have at present but one means of detecting stricture here, and that is the uncertain one of the rectal bougie, unless we open the abdomen and search. Let me exemplify this by one of my own cases. The patient in apparent perfect health was sent to me for diagnosis by Dr. Janeway. He complained only of a little blood in the passages, easily accounted for by hæmorrhoids; and of a pain deep down in the left side of the pelvis. The hæmorrhoids were removed; for a time the patient was better; then the symptoms were the same as before. Examination in the left inguinal region and pelvis showed only the sigmoid flexure, hard and round, rolling under the fingers. A full-sized rectal bougie, twelve inches long, passed without difficulty. Even with this evidence I could only say that the upper part of the rectum would admit a No. 8 rectal bougie. I could not say there was no disease, and I was cautious in my diagnosis, as Dr. Janeway had been before me; merely telling the patient there was but one way to settle the question and that was by an exploratory incision. This he declined, as I should have done, because the symptoms hardly seemed to justify it, and yet within a few weeks he died of acute obstruction from annular cancerous stricture of the sigmoid flexure.

In this matter bougies are only of limited utility. If I could pass no bougie at all after proper trials, and if, under ether, I still failed to effect the passage of an instrument I should not hesitate to make a positive diagnosis of a very tight stricture. Also, if a medium-sized bougie, say No. 7, passed easily, but a No. 8 could not be passed, and the symptoms pointed to old ulceration of the intestine, I should diagnosticate a contraction, but I should not do so till after several careful trials with the instruments.

It would seem as though the same facility in diagnosis in the upper rectum could be reached as in the deep urethra, but it has never yet been acquired. Attempts at the same kind

of exploration with bulbous bougies on pewter stems have been made, and several varieties of these are now in the market, but they have been unsatisfactory in my own hands. They are more difficult to pass than the flexible pure rubber bougie, and when passed they are not sufficiently delicate to detect strictures of large calibre.

In passing a rectal bougie the first obstruction is always

FIG. 1.—Soft-Rubber Rectal Bougie.

at the promontory of the sacrum, and the next is by the loose folds of mucous membrane. With a flexible rubber bougie the promontory can be passed without difficulty or force, and by the injection of water through the bougie the folds of mucous membrane can be drawn out of the way by dilating the canal, and the instrument passed full length. With the olive-

FIG. 2.—Metallic or Vulcanite Bougie.

pointed bougie on the metal stem, the promontory can only be passed by introducing the finger and lifting the end of the bougie over it, and beyond this all is uncertain.

I am now experimenting with a distinct olivary point and narrow neck on a soft rubber bougie with which I hope to accomplish something. In the ordinary bougie the olive point

FIG. 3.—Soft-Rubber Bulbous Bougie.

is too small to be of any use in diagnosis as is seen by Fig. 1. In the olive-pointed metal bougie shown in the cut (Fig. 2) the metallic stem is much inferior to the soft-rubber bougie, and any bending of it before introducing it only complicates matters and makes it more difficult to pass. It seems to me tha an instrument can be made combining the advantages of both such, as is shown in Fig. 3.

Still one other method of diagnosis is open to us—the passage of the whole hand into the rectum. This is impossible for the average hand, and for any hand is more dangerous than an exploratory laparotomy. It requires an exceptionally small and narrow hand to practise this manœuvre with any degree of safety.

Should exploratory incision be decided upon, it should be made as for left inguinal colotomy, in order that an artificial anus may be established at the same time should a stricture be discovered.

On the whole, then, we can say that the mere diagnosis of the existence of stricture in the lower part of the rectum is easy, and beyond the reach of digital examination very difficult. After the presence of stricture has been decided upon, the determination of its character may also be a matter of great difficulty.

The first great point to be decided is between cancer and non-malignant disease.

There is an old and deeply rooted idea in the minds of the profession that a stricture of the rectum must be either cancerous or syphilitic—an idea founded on error and capable of doing much harm and injustice to people innocent of any sexual irregularities. Again and again I have been able to give great comfort to women suffering from this disease by disputing the correctness of this idea; and in my own practice the fact that a stricture is not cancerous adds little weight to the idea that it may be syphilitic.

In the collection of cases given at the end of this article it will be seen that of all non-malignant strictures only a small proportion were palpably venereal. Any of the gentlemen who have followed my clinic for any length of time will agree that the proportion of venereal strictures of the rectum is much smaller than they expected when beginning the study; and I use the word venereal intentionally to cover not only syphilis, but all possible diseases arising from the sexual act or its abuse.

Outside of cancer and venereal disease I have in the table enumerated the following varieties of stricture: Congenital; spasmodic; those due to pressure on the gut; dysenteric; tubercular; inflammatory; and traumatic. Each of these causes must be allowed its full weight in determining the nature of

any particular case, for none of them are so rare that they can be safely neglected.

To make the diagnosis as to the exact nature of a stricture may in some cases be impossible, but there are certain facts which will be found of great assistance.

As a first step in the differential diagnosis between malignant and non-malignant stricture the length of time the disease has existed is of great practical help. Cancer of the rectum generally runs its course in two or three years. When, therefore, a patient says stricture and ulceration have existed ten, fifteen, or twenty years a great point has been gained. When, on the other hand, a middle-aged patient says that the symptoms date back only a few months, and an examination reveals masses of hard tissue occluding the bowel, with more or less destructive ulceration, the disease can hardly be other than malignant. By careful attention to the history alone, the nature of the affection can thus very often be determined.

In other cases digital examination alone is sufficient for the differential diagnosis. Generally cancer in the rectum presents itself to the sight and touch as a mass of stony hardness, nodular, irregular, and without pedicle; growing in the substance of the rectal wall and involving all adjacent tissue; with no tendency to isolate itself and hang free in the cavity of the gut. More rarely it is seen in the form of a deep ulceration with hard floor and raised hard edges—an ulceration so pronounced and so destructive as to leave no room for doubt as to its nature. Again it not unfrequently presents itself as a bleeding, fungous mass involving the whole substance of the rectal wall, filling and occluding the gut, and perhaps extruding at each act of defecation.

In either of these three clinical forms the gross characteristics are diagnostic; and with experience it is not generally difficult to decide between malignant and non-malignant disease. The cases most doubtful are those where the rectum is occluded by dense masses of fibrous tissue—dysenteric, venereal, or resulting from simple ulceration. In these the amount of disease may be as great as or greater than in cancerous infiltration, and the hardness to the touch may be the same; but the history of the case and the length of time it has existed will generally solve the question.

Enlarged glands in the groin or hollow of the sacrum are of great value when found, and we always have the microscope to appeal to in case of doubt.

I would not, however, give the impression that this diagnosis between benign and malignant disease can always be made absolutely, either by the history or by digital examination, for such is not my experience, and I am occasionally very glad to secure a piece of the growth for microscopic examination before committing myself to a positive diagnosis. The following statement by Allingham has always represented to me a wonderful clinical experience. He says: "There is something peculiar about the feel of cancer, which the practised finger rarely mistakes even for simple indurated ulceration. I think it is many years now since I mistook the one for the other. There is also a peculiar odor which one cannot describe, but which once recognized will rarely be forgotten. In my opinion the odor is pathognomonic." This odor of cancer I have never been able to distinguish as anything diagnostic, and I confess to a feeling of relief when in Cripps's monograph on this subject I find that he also appreciates that in some cases the diagnosis may be difficult.

Greater difficulty may be found in the differential diagnosis of the different forms of non-malignant stricture from each other, than in deciding the first great question of cancer. Dysenteric contraction is known by the history and often by the extensive character of the fibrous induration. Tubercular disease may first be suspected from the patient's general condition, from the coexistence of lung trouble, or the family history; and the diagnosis may then be confirmed under the microscope. In congenital stricture in adult life the existence of a knife-edge constriction without ulceration or induration is diagnostic. Strictures resulting from slight traumatism, such as operations for hæmorrhoids, may be recognized by the absence of any other exciting cause, as syphilis, and by the history of long-continued ulceration.

The moment we attempt to say positively that any stricture is or is not of venereal origin we begin to trench upon the unknown.

In the collection of cases which forms the basis of this article some have been classified as syphilitic, and I have no doubt of the correctness of this diagnosis; but were I forced

to give the reasons for this belief I could only say that these patients had other well-marked signs of syphilis, and that the stricture was of a type which I have come to consider as indicating a syphilitic origin. The test of treatment does not apply in these cases, for neither mercury nor iodine has any effect. We know, however, beyond question, that chancroids, late syphilitic ulcerations, and gummatous infiltrations do occur in the rectum, and do cause extensive strictures; and where no other cause can be found, and there is a reliable venereal history, we are justified in attributing certain strictures to these causes; but we are not justified in considering venereal disease as accounting for all cases of otherwise doubtful origin. In my table I have put down almost as many strictures as positively non-venereal as have been included among the venereal, and a number more as undetermined. In the former cases I was firmly convinced that the patient had never had venereal disease, and in the latter, a doubtful venereal history had no more weight with me in the diagnosis than any other of the possible causes.

Among the venereal strictures as distinguished from the syphilitic, cases will occasionally occur in which the possible causative influence of unnatural sexual vice must be considered. In my table there are two of these, one in a man, the other in a woman, both of whom acknowledged the practice. In both the vice was of long standing and in both there was ulceration and contraction; but whether simply traumatic or due to infection there was no way of deciding. In one the stricture was of considerable extent, and from its probably malignant nature I extirpated it with good result as to both subsequent stricture and incontinence. Examination of the specimen under the microscope, however, showed nothing but a very unusual amount of fibrous tissue.

Treatment.

The greatest advances in the surgery of the rectum have been made during the past decade in the treatment of stricture. Cases which a few years ago were allowed to die without surgical aid are now made perfectly comfortable; and operations which were then considered as hardly justifiable are now of daily occurrence and give the happiest results.

The means at our command for the treatment of this affection are: 1. Dilatation; 2. Incision; 3. Partial Destruction, including Electrolysis and *Raclage;* 4. Excision; 5. Colotomy; 6. General Treatment.

DILATATION.

This, either alone or in connection with incision, is one of the most reliable agents for the treatment of this disease. By dilatation I mean gradual stretching, not forcible divulsion. The latter is a justifiable procedure; one which under certain conditions may accomplish great good, but one seldom applicable.

Whether dilatation be practised as an independent method of treatment or as a supplement to division, it should always be practised in one way. Nothing is productive of more evil than forcing a bougie through a stricture when the instrument is too large to be passed without pain and violence, and no good is ever accomplished in this way. A bougie that is large enough to cause pain by stretching is always too large to do anything but harm.

The instrument best adapted for this purpose is the soft rubber one shown in Fig. 1. A size should be selected which will pass through the stricture without force and which may be left in place several hours without causing uneasiness. In this way absorption of the stricture tissue may be caused, and great benefit may result. It is a well-known fact that if the smallest filiform bougie be passed through a stricture of the urethra and allowed to remain for a day or two, a much larger size can then be substituted for it, and the same is true of the rectum. Any instrument the introduction of which causes pain will soon cause so much irritation as to render its use impossible; while with gentleness and time most non-malignant strictures may be greatly benefited.

My own rule is to select an instrument which can be left in place several hours, often all night, and to introduce it daily. When the disease is so high up that the long bougie is necessary, its introduction should never be left either to patient or nurse; for even with the soft rubber one mentioned great harm may be done. In cases where the disease is nearer the anus I have had these same instruments made five inches

long instead of twelve, and these may safely be entrusted to the patient. They are numbered in sizes from one to twelve (Fig. 4).

The treatment by gentle dilatation will accomplish most in cases of limited severity and as a supplement to the treatment by incision or excision. Some of the old fibrous strictures are too extensive to be relieved in this way, and in malignant

FIG. 4.—Short Bougie for Dilatation.

disease it can do little if any good—the disease steadily advancing. A patient with a malignant stricture which is threatening obstruction needs more radical treatment than the bougie, and, except in case of threatened obstruction, no possible good can be accomplished by it.

INCISION.

The treatment of stricture by linear proctotomy was introduced by the French surgeons, and judged by their first enthusiastic reports it seemed that by it alone a radical cure could be effected. Subsequent experience has convinced me that such is not the case, and that, like the analogous operation of external urethrotomy, it must be followed by dilatation to preserve the channel opened up by the knife. As a means of saving time, and of gaining a wider passage than can be hoped for from the bougie alone, it is of great value.

Two operations are spoken of—internal and external posterior linear proctotomy. The internal consists simply of a division of the stricture tissue alone by an incision in the median line behind; the cut being deep enough to completely divide all of the fibrous tissues. The external operation does this and more, inasmuch as it divides not only the stricture but also all of the tissue between it and the anus, with the sphincters.

The internal incision alone is a very dangerous one. It is often asked why, after dividing the constriction, go on and divide healthy tissue below it, including the sphincters? Simply for drainage. The most dangerous incisions in the surgery

of the rectum are those made into and through the wall of the bowel which are not continued to the surface—dangerous both from hemorrhage and sepsis. In the only case in which I ever performed this partial incision it was followed by a dangerous pelvic inflammation.

The external operation, on the other hand, provides for the control of hemorrhage and for drainage in the most perfect way, and is therefore much safer though more extensive.

The originators of this operation employed either the Paquelin cautery knife or the chain *écraseur* for the incision, both of them being bloodless; and in my own first cases I used the cautery. But the bleeding with the external operation is not a matter to be feared, being easily controlled by packing the incision with charpie, and I now use a straight, blunt-pointed bistoury passed into the bowel and through the stricture on the left index finger as a guide. Care should be taken to have the incision reach well above and well through all the stricture tissue, and to be as nearly as possible in the median line behind.

The danger of subsequent incontinence from this incision, if the sphincters are in good condition when it is made, is not very great; but the wound at the anus generally takes many weeks to heal and this is a great objection to it. There are two ways of avoiding this. One suggested and practised with good result by Weir is to confine the incision to the stricture, leaving the anus intact; and to drain this incision by a tube brought out through the skin at the tip of the coccyx. This I have tried in several cases with the result of saving much time. The tube should be left in till all danger of periproctitis has passed. If there be no rise of temperature by the fourth day it may be safely removed, and the wound caused by it will generally heal promptly.

Another method I have sometimes used is to divide the sphincters and then employ three or four deep provisional wire sutures between the anus and the stricture, leaving them loose and stuffing the incision with charpie. When all danger is passed and granulation is well under way the opposing surfaces are scraped and the sutures tightened. This may be done at about the end of the first week, and as more or less firm union is pretty sure to result considerable time is saved.

The one great danger of this operation is septic periprocti-

tis, and with proper precautions as to antisepsis and drainage this may generally be avoided. The danger of primary hemorrhage is not great. No large vessels are cut and all bleeding is within easy reach. It can seldom be necessary to tie any vessel as the wound can so readily be tightly packed with charpie. Secondary hamorrhage I have seen once in a case of very extensive cancer divided with the cautery.

The after-treatment consists only in the use of the bougie, commenced as soon as the incision has begun to fairly close up, that is to say, after three or four weeks, and followed steadily and gently as already indicated. The bougie should be used for three or four hours each day, or, as is my favorite practice, introduced when the patient goes to bed and left in all night.

In the great majority of cases the short instrument will reach above the disease, and after one or two trials its use may be left to the patient. If pain is complained of it is a sure indication that the instrument is too large and is doing harm.

My own experience with this method is given at the end of this article. Only three of the cases were malignant, and these three have given me no encouragement to continue its use--in fact my old antipathy to colotomy is the only reason for ever having employed it in malignant stricture. The first case of malignant disease was the one in which severe and almost fatal secondary hemorrhage occurred on the separation of the sloughs made by the cautery. The patient was a middle-aged woman with extensive cancerous deposit and yet in good condition. The disease seemed low down and the rectum was nearly occluded. After cutting through the first stricture, a large ulcerated cavity was opened up, and above this was a second stricture, also so tight that the opening could hardly be discovered. This I also divided with great difficulty and constant fear of the peritoneum. The operation was attended by a good deal of shock and the patient lived only a few months. From her good general condition I am satisfied she might have lived two or three years with a colotomy.

The second case of cancer was in a young man also with extensive disease. He died on the tenth day, apparently from exhaustion, mixed with some anomalous symptoms of septic peritonitis.

The third case—in a young woman—was fatal in eight hours. The disease was not as extensive as in either of the other two, but the patient was exhausted by chronic intestinal obstruction, and sank quickly from the shock of the operation. She might have done the same from a colotomy, but both of the others would probably have done much better after colotomy than proctotomy.

Neither theoretically nor from my own experience can I recommend this operation in malignant disease. The danger of it is certainly as great as that of a colotomy, and nothing more than temporary slight benefit can be hoped for, as in the nature of the case subsequent dilatation can do little good.

While proctotomy has been thus unsatisfactory in malignant disease, exactly the opposite has been the case in all of the benign strictures, and here I have never had occasion to regret its performance. For all cases of non-malignant stricture which are not so far beyond the reach of local treatment that colotomy is indicated from the first, the choice must lie between this plan of treatment and complete excision. I have within a few weeks performed colotomy on a patient for whom I did proctotomy nine years ago, and who for five years after the operation was in a greatly improved condition, though at that time most men, I think, would have considered her beyond hope of relief from anything except a colotomy, so grievous was her condition: she, however, gained health and strength and was able to keep the stricture well under control till about two years ago, when a large pelvic abscess formed on the left side, nearly occluding the gut above the original stricture, and discharging large quantities of pus into the rectum. For this second condition, together with the old stricture, I did the colotomy, as the combination was rapidly exhausting her.

Although there had been some recontraction, there had been no increase in the amount of fibrous tissue, and no return of the ulceration which had been cured by the operation of nine years before.

Other cases I have now under observation in which the patients have been so greatly improved that they consider themselves almost entirely cured, and can only be induced to use the bougie at long intervals—cases in which all straining, tenesmus, and purulent discharge have ceased, and in which the patients have one natural painless passage daily. As

long as these patients can be made to care for themselves and to continue the use of the bougie with regularity they are perfectly comfortable, but the neglect of the bougie has in my experience invariably been followed by recontraction.

In a general way it may be said of this plan of treatment that in selected cases of non-malignant disease—those in which the ulceration and contraction are of limited area and do not involve too great an extent of the gut in length, though perhaps almost completely occluding it—it is to be preferred over all others. In them it is a satisfactory substitute for colotomy or exsection, and in some it will effect as near a cure as is ever gained in this disease.

Partial Destruction. Electrolysis. Raclage.

The consideration of these things need detain us but a moment. In benign strictures all that they can accomplish can be done better by linear proctotomy, and in malignant disease they are contra-indicated. The cauterization or scraping of old non-malignant ulcers of the rectum has its undisputed value; but nothing more unsurgical can well be imagined than the application of nitric acid to a cancerous rectum, or the attempt at partial destruction and removal by any other means. In the days when extirpation was considered unjustifiable, and colotomy as worse than death, these things had their place, but they are now simply examples of timid and meddlesome surgery.

With regard to electrolysis we occasionally see a case of "perfect cure" reported by this means in some journal, but never one in which the certainty of that result is verified beyond suspicion. Electrolysis reduced to fact means in the treatment of stricture of the rectum either simple dilatation or the application of the cautery. The olive-pointed electrodes placed against a stricture and gently pressed inward for ten or fifteen minutes will cause exactly the same amount of dilatation and absorption whether the elaborate battery be connected with them or not; and when we come to cauterization the battery will accomplish no more and no less than any other destructive agent. This at least is the result of a careful series of experiments with this means of treatment in my own practice—experiments which, after two years' trial, had ac-

Still one other method of diagnosis is open to us—the passage of the whole hand into the rectum. This is impossible for the average hand, and for any hand is more dangerous than an exploratory laparotomy. It requires an exceptionally small and narrow hand to practise this manœuvre with any degree of safety.

Should exploratory incision be decided upon, it should be made as for left inguinal colotomy, in order that an artificial anus may be established at the same time should a stricture be discovered.

On the whole, then, we can say that the mere diagnosis of the existence of stricture in the lower part of the rectum is easy, and beyond the reach of digital examination very difficult. After the presence of stricture has been decided upon, the determination of its character may also be a matter of great difficulty.

The first great point to be decided is between cancer and non-malignant disease.

There is an old and deeply rooted idea in the minds of the profession that a stricture of the rectum must be either cancerous or syphilitic—an idea founded on error and capable of doing much harm and injustice to people innocent of any sexual irregularities. Again and again I have been able to give great comfort to women suffering from this disease by disputing the correctness of this idea; and in my own practice the fact that a stricture is not cancerous adds little weight to the idea that it may be syphilitic.

In the collection of cases given at the end of this article it will be seen that of all non-malignant strictures only a small proportion were palpably venereal. Any of the gentlemen who have followed my clinic for any length of time will agree that the proportion of venereal strictures of the rectum is much smaller than they expected when beginning the study; and I use the word venereal intentionally to cover not only syphilis, but all possible diseases arising from the sexual act or its abuse.

Outside of cancer and venereal disease I have in the table enumerated the following varieties of stricture: Congenital; spasmodic; those due to pressure on the gut; dysenteric; tubercular; inflammatory; and traumatic. Each of these causes must be allowed its full weight in determining the nature of

any particular case, for none of them are so rare that they can be safely neglected.

To make the diagnosis as to the exact nature of a stricture may in some cases be impossible, but there are certain facts which will be found of great assistance.

As a first step in the differential diagnosis between malignant and non-malignant stricture the length of time the disease has existed is of great practical help. Cancer of the rectum generally runs its course in two or three years. When, therefore, a patient says stricture and ulceration have existed ten, fifteen, or twenty years a great point has been gained. When, on the other hand, a middle-aged patient says that the symptoms date back only a few months, and an examination reveals masses of hard tissue occluding the bowel, with more or less destructive ulceration, the disease can hardly be other than malignant. By careful attention to the history alone, the nature of the affection can thus very often be determined.

In other cases digital examination alone is sufficient for the differential diagnosis. Generally cancer in the rectum presents itself to the sight and touch as a mass of stony hardness, nodular, irregular, and without pedicle; growing in the substance of the rectal wall and involving all adjacent tissue; with no tendency to isolate itself and hang free in the cavity of the gut. More rarely it is seen in the form of a deep ulceration with hard floor and raised hard edges—an ulceration so pronounced and so destructive as to leave no room for doubt as to its nature. Again it not unfrequently presents itself as a bleeding, fungous mass involving the whole substance of the rectal wall, filling and occluding the gut, and perhaps extruding at each act of defecation.

In either of these three clinical forms the gross characteristics are diagnostic; and with experience it is not generally difficult to decide between malignant and non-malignant disease. The cases most doubtful are those where the rectum is occluded by dense masses of fibrous tissue—dysenteric, venereal, or resulting from simple ulceration. In these the amount of disease may be as great as or greater than in cancerous infiltration, and the hardness to the touch may be the same; but the history of the case and the length of time it has existed will generally solve the question.

Enlarged glands in the groin or hollow of the sacrum are of great value when found, and we always have the microscope to appeal to in case of doubt.

I would not, however, give the impression that this diagnosis between benign and malignant disease can always be made absolutely, either by the history or by digital examination, for such is not my experience, and I am occasionally very glad to secure a piece of the growth for microscopic examination before committing myself to a positive diagnosis. The following statement by Allingham has always represented to me a wonderful clinical experience. He says: "There is something peculiar about the feel of cancer, which the practised finger rarely mistakes even for simple indurated ulceration. I think it is many years now since I mistook the one for the other. There is also a peculiar odor which one cannot describe, but which once recognized will rarely be forgotten. In my opinion the odor is pathognomonic." This odor of cancer I have never been able to distinguish as anything diagnostic, and I confess to a feeling of relief when in Cripps's monograph on this subject I find that he also appreciates that in some cases the diagnosis may be difficult.

Greater difficulty may be found in the differential diagnosis of the different forms of non-malignant stricture from each other, than in deciding the first great question of cancer. Dysenteric contraction is known by the history and often by the extensive character of the fibrous induration. Tubercular disease may first be suspected from the patient's general condition, from the coexistence of lung trouble, or the family history; and the diagnosis may then be confirmed under the microscope. In congenital stricture in adult life the existence of a knife-edge constriction without ulceration or induration is diagnostic. Strictures resulting from slight traumatism, such as operations for hæmorrhoids, may be recognized by the absence of any other exciting cause, as syphilis, and by the history of long-continued ulceration.

The moment we attempt to say positively that any stricture is or is not of venereal origin we begin to trench upon the unknown.

In the collection of cases which forms the basis of this article some have been classified as syphilitic, and I have no doubt of the correctness of this diagnosis; but were I forced

to give the reasons for this belief I could only say that these patients had other well-marked signs of syphilis, and that the stricture was of a type which I have come to consider as indicating a syphilitic origin. The test of treatment does not apply in these cases, for neither mercury nor iodine has any effect. We know, however, beyond question, that chancroids, late syphilitic ulcerations, and gummatous infiltrations do occur in the rectum, and do cause extensive strictures; and where no other cause can be found, and there is a reliable venereal history, we are justified in attributing certain strictures to these causes; but we are not justified in considering venereal disease as accounting for all cases of otherwise doubtful origin. In my table I have put down almost as many strictures as positively non-venereal as have been included among the venereal, and a number more as undetermined. In the former cases I was firmly convinced that the patient had never had venereal disease, and in the latter, a doubtful venereal history had no more weight with me in the diagnosis than any other of the possible causes.

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Treatment.

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DILATATION.

This, either alone or in connection with incision, is one of the most reliable agents for the treatment of this disease. By dilatation I mean gradual stretching, not forcible divulsion. The latter is a justifiable procedure; one which under certain conditions may accomplish great good, but one seldom applicable.

Whether dilatation be practised as an independent method of treatment or as a supplement to division, it should always be practised in one way. Nothing is productive of more evil than forcing a bougie through a stricture when the instrument is too large to be passed without pain and violence, and no good is ever accomplished in this way. A bougie that is large enough to cause pain by stretching is always too large to do anything but harm.

The instrument best adapted for this purpose is the soft rubber one shown in Fig. 1. A size should be selected which will pass through the stricture without force and which may be left in place several hours without causing uneasiness. In this way absorption of the stricture tissue may be caused, and great benefit may result. It is a well-known fact that if the smallest filiform bougie be passed through a stricture of the urethra and allowed to remain for a day or two, a much larger size can then be substituted for it, and the same is true of the rectum. Any instrument the introduction of which causes pain will soon cause so much irritation as to render its use impossible; while with gentleness and time most non-malignant strictures may be greatly benefited.

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The treatment by gentle dilatation will accomplish most in cases of limited severity and as a supplement to the treatment by incision or excision. Some of the old fibrous strictures are too extensive to be relieved in this way, and in malignant

FIG. 4.—Short Bougie for Dilatation.

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INCISION.

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The internal incision alone is a very dangerous one. It is often asked why, after dividing the constriction, go on and divide healthy tissue below it, including the sphincters? Simply for drainage. The most dangerous incisions in the surgery

of the rectum are those made into and through the wall of the bowel which are not continued to the surface—dangerous both from hemorrhage and sepsis. In the only case in which I ever performed this partial incision it was followed by a dangerous pelvic inflammation.

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The danger of subsequent incontinence from this incision, if the sphincters are in good condition when it is made, is not very great; but the wound at the anus generally takes many weeks to heal and this is a great objection to it. There are two ways of avoiding this. One suggested and practised with good result by Weir is to confine the incision to the stricture, leaving the anus intact; and to drain this incision by a tube brought out through the skin at the tip of the coccyx. This I have tried in several cases with the result of saving much time. The tube should be left in till all danger of periproctitis has passed. If there be no rise of temperature by the fourth day it may be safely removed, and the wound caused by it will generally heal promptly.

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The after-treatment consists only in the use of the bougie, commenced as soon as the incision has begun to fairly close up, that is to say, after three or four weeks, and followed steadily and gently as already indicated. The bougie should be used for three or four hours each day, or, as is my favorite practice, introduced when the patient goes to bed and left in all night.

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Partial Destruction. Electrolysis. Raclage.

The consideration of these things need detain us but a moment. In benign strictures all that they can accomplish can be done better by linear proctotomy, and in malignant disease they are contra-indicated. The cauterization or scraping of old non-malignant ulcers of the rectum has its undisputed value; but nothing more unsurgical can well be imagined than the application of nitric acid to a cancerous rectum, or the attempt at partial destruction and removal by any other means. In the days when extirpation was considered unjustifiable, and colotomy as worse than death, these things had their place, but they are now simply examples of timid and meddlesome surgery.

With regard to electrolysis we occasionally see a case of "perfect cure" reported by this means in some journal, but never one in which the certainty of that result is verified beyond suspicion. Electrolysis reduced to fact means in the treatment of stricture of the rectum either simple dilatation or the application of the cautery. The olive-pointed electrodes placed against a stricture and gently pressed inward for ten or fifteen minutes will cause exactly the same amount of dilatation and absorption whether the elaborate battery be connected with them or not; and when we come to cauterization the battery will accomplish no more and no less than any other destructive agent. This at least is the result of a careful series of experiments with this means of treatment in my own practice—experiments which, after two years' trial, had ac-

complished nothing not attainable by much simpler means. I do not mean to say that with a current of sufficient strength a passage cannot be made through a cancerous stricture, because this is exactly what can be done, but a mild current has no effect and a strong one simply cauterizes.

Excision.

With regard to excision there are two questions to be considered: First, the class of cases to which it is best adapted; and, second, the best method of its performance.

Extirpation of the rectum has until recently been considered as indicated only in malignant disease, but of the propriety of thus limiting the scope of the operation I am beginning to have serious doubts—doubts which will be settled not alone by the supposed dangers of the operation, but also by the comparative comfort of the patients with extensive benign strictures after extirpation and after the other methods of treatment at our disposal. The danger of extirpation in selected cases is not, to my mind, so much greater than that of proctotomy that I should hesitate on this account alone to do the former instead of the latter, were I satisfied that by it the patient could be rendered more comfortable, both as regards fæcal incontinence and subsequent stricture due to the operation.

My personal experience with extirpation of benign stricture is limited, as will be seen by the table, but all of the cases have resulted favorably as regards sphincteric power and the absence of recontraction; and though these are manifestly not sufficient to generalize upon, they are enough to make me anxious to try the treatment further in selected cases. As it appears to me now, it is a possible substitute for proctotomy and dilatation in the class of cases to which these are best applicable, rather than for colotomy. Were the disease sufficiently extensive to make colotomy seem necessary, it would probably be too great for extirpation, as is the case with malignant stricture. But where the induration is great, the stricture close, and yet so much of the gut is not involved in length that a complete circular resection with preservation of the sphincters cannot be done, I am not sure that experience will not soon teach that it is better to relieve the patient of

his disease at one stroke than to trust to making him comfortable by proctotomy and subsequent dilatation. It is the choice between cure and palliation, and it must be decided by the condition in which the rectum can be left as regards stricture and incontinence after extirpation.

Extirpation for cancerous disease will hardly again in the future be abandoned, as it was in the past, as unjustifiable. All that now remains for it is to decide the proper limits of its applicability and if possible improve upon its technique. Even were it to be decided that in a majority of cases an early colotomy gave longer life than extirpation, we should probably all go on doing the latter operation; for a possible cure would more than counterbalance any additional safety of colotomy with its certain death after a time but short at the best.

The limits of extirpation in cancer have not yet been determined. On the one hand are the German surgeons tending to the most radical operations and removing the entire rectum up to the sigmoid flexure with at least temporary success. Opposed to these are the English specialists advocating more conservative practice, and tending to restrict the operation to disease of comparatively limited extent; while in America we are trying both plans, doing at times fully as radical operations as the Germans, and waiting for the results of clinical experience.

Since Kraske has shown us a new way of attacking the rectum, the mere question of the length of gut to be removed has lost some of its importance; and the question is now not whether the disease reaches above a point which can easily be attained by dividing the anus and rectum down to the tip of the coccyx; but whether, when the disease is much more extensive than this, its removal, which is surgically possible, is attended by good results in prolonging life. No surgeon would to-day hesitate to remove eight inches of rectum instead of three were he convinced that in such extensive disease all involved lymphatics could also be removed, and that the chance of immediate recurrence was no greater in the major than in the minor operation.

One rule may be considered as established—the disease should not be attacked with the knife unless there is reasonable certainty that it can all be removed, and that that the lymphatics have not to any extent become involved. A chain

of lymphatics in the hollow of the sacrum may sometimes be extirpated if they are involved at the time of the operation, but the chance of removing them all under such circumstances is not good, and a speedy return may be anticipated. A point has also recently been made by Cripps that the operation is of doubtful propriety when the disease involves the upper part of the recto-vaginal septum where it is covered by peritoneum; for the reason that the latter, if involved, will speedily cause a recurrence. If this point be well taken, it will greatly limit the field of the operation, and reduce it to what was its limit before Kraske's method was discovered, that is, to disease low down in the rectum and freely movable on the adjacent structures. The fear of wounding the peritoneum itself has long since passed away, the mere opening of that cavity having little effect upon the mortality of the operation.

In deciding the question as to the immediate mortality of exsection, a large number of cases by an individual operator is much more valuable than an equal number of scattered cases by various surgeons; for the success or fatality of this operation may easily depend upon individual skill. Other things being equal, the man who has operated most frequently will get the best results.

Before undertaking an extirpation, the patient should be carefully prepared for operation. Rest in bed for a few days to accustom him to the enforced quiet to follow is an excellent idea. The bowels should be thoroughly unloaded, beginning with something to act upon the liver at least three days before the operation, and following this with small doses of salines on the succeeding days. Two hours before operation a final enema of water should be administered and the ano-perineal region, buttocks, and sacral region thoroughly disinfected, first by shaving and then by washing with bichloride 1 to 2,000.

Although this usual and advantageous preparation of the patient is always best when possible, in some cases of tight stricture and fæcal impaction a course of purgation may end fatally from a weakened and ulcerated bowel, or may fail entirely to bring away anything but fluid. Where the passage is comparatively free, my own rule is to clear out the bowels, but in cases of tight stricture with chronic obstruction the danger of this course is greater than that of operation in the patient's usual condition.

Either ether or chlorofor mmay be used as an anæsthetic, depending upon the condition of the patient or the preferences of the operator; and the patient should be held in the lithotomy position by Clover's clutch, provided the incision is to be in the perineum (Fig. 5).

The technique of the operation will vary with the amount of disease to be removed. Let us take first a case of stricture beginning an inch or so above the sphincters and extending say three or four inches up the bowel, in which it is necessary to remove a complete cylinder of the rectum. One great ob-

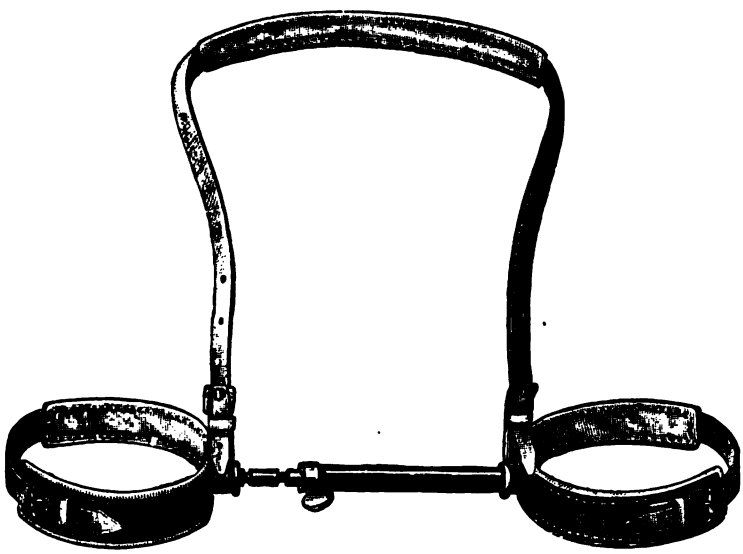

FIG. 5.—Clover's Crutch (Peter's Modification).

ject will be to preserve the anus and sphincters intact, and this may easily be done by the following method.

A blunt-pointed straight bistoury is passed into the rectum and the anus is divided in the median line behind as far up as is possible without encroaching upon the disease. For safety half an inch of healthy mucous membrane should be removed with the affected part both above and below the edge of the cancer, and the rectum by this first dorsal incision through the sphincters should be divided up to that limit.

The blunt-pointed bistoury is of no further use and a long, strong, sharp-pointed scalpel is substituted. This is entered

in the wound already made and passed along behind the rectum till its point has passed the upper limit of the growth as indicated by the finger of the left hand in the gut. All of the tissue behind the gut with the skin is then divided in the median line by a single sweep of the knife. The second incision simply deepens the first and carries it to a point above the disease; though the first divided bowel and the second

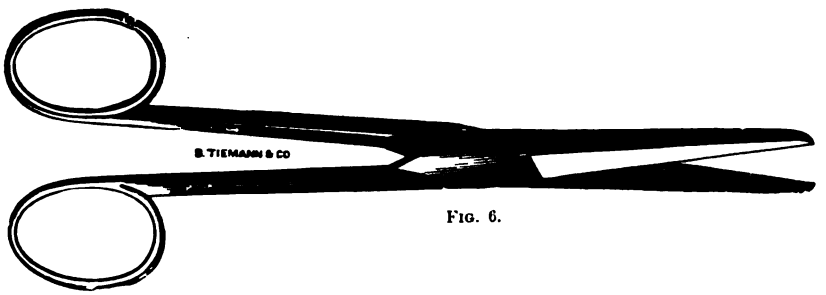

FIG. 6.

does not touch bowel but divides the tissue behind it. The object is to dissect out as rapidly as possible the diseased portion of gut as a cylinder and without dividing it.

The second knife is now abandoned and the operation is completed with the scissors shown in the cut, Fig. 6, the dorsal incision being tightly packed with large firm sponges and the edges of the wound held open by the retractors shown, Fig. 7.

With the left index finger in the diseased cylinder for a guide, the right side of the affected gut is freed from its at-

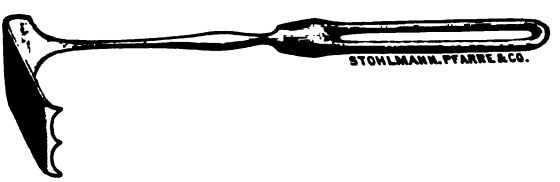

FIG. 7.—Retractor.

tachments in the ischio-rectal fossa by a few bold cuts with the scissors till the attachment of the levator ani on that side is reached and cut through, and the same thing is done on the left side as rapidly as possible. If the operator be ambidextrous the hands may be changed, otherwise the cutting on the left side may easily be accomplished by crossing hands. The skill and boldness of the operator is shown at this part of the

operation better than at any other. The inexperienced tries to make a careful dissection and stops for hemorrhage, while he who has operated before, completes this stage of the work with a few bold strokes and leaves the bleeding to his assistant with his sponges and pressure.

The next stage in the operation is the separation of the rectum from its attachments in front to the prostate in the male and the vagina in the female. In the male a sound in the bladder is of great assistance, and the separation in either sex can best be accomplished with the handle of a scalpel or the closed blades of the scissors, unless the disease has invaded adjacent parts, when slower work with the knife may be necessary.

In this operation two or three pairs of long forceps such as are shown in Fig. 8 will be found of great assistance. In one of my own cases the stricture was so tight that the index

Fig. 8.—Long Forceps for Incision.

finger could not be passed through it as a guide, and the whole mass was seized with such a pair of forceps while the dissection was carried out around it.

When the separation has been properly completed on all sides, the diseased cylinder will be found to be perfectly free and can be pulled down and cut off above the disease with ease. If it does not come down to the surface easily, the point of attachment will usually be found at the insertion of some fibres of the levator. The healthy rectum is then seized with a pair of long forceps to prevent its retraction, and the gut is cut across with the scissors about half an inch above the disease; the wound is tightly packed with sponges and the specimen examined carefully to see that the operation has been complete and that no cancerous tissue has been left.

Up to this point no bleeding vessels have been tied. Excepting the first dorsal incision it is useless to tie them till the operation is completed, as they all come from above and the same vessel may be cut across and require the ligature several

times. It is much better to trust to sponges to control the bleeding till the extirpation is completed, when it will be found that only a few ounces of blood have been lost and not more than half a dozen ligatures are required. I have completed the operation with only two ligatures.

The operation from the time of the first incision to the section of the bowel above the disease and the securing of all bleeding points should not consume in a simple case more than ten minutes, and in a difficult one five more may be allowed for separating the gut from its anterior attachments. It will be seen at once that this is a very different matter from the old and tedious dissection from below upward, made with successive strokes of the knife and requiring hours for the application of ligatures, each vessel being cut and tied again and again as the dissection was carried upward into the pelvis.

The subsequent treatment of the wound thus made is a matter of individual preference.

The German surgeons generally try to get primary union by drawing the end of the rectum down to the skin, attaching it by a row of sutures; closing as much as possible of the dorsal incision and introducing drainage tubes.

The English operators (Cripps, Allingham) prefer the greater safety of an open wound, stitch the gut lightly to the skin, introduce drainage tubes, and leave the wound to close by granulation.

In my own earlier cases I leaned to the latter method, but having had no bad results from this cause I have in each successive case tried a little more definitely for as much primary union as possible. Much time is saved if any considerable part of the incision can be closed by first intention, and there is less cicatricial stricture to be dilated subsequently. For this reason I now draw the end of the gut well down, fasten it accurately to the sphincters in front and at the sides, pass a drainage tube into the dorsal incision on each side of the gut at the level of the tip of the coccyx, and introduce deep silver sutures to close the dorsal incision but leave them loose. The dorsal incision is then packed with iodoform gauze. After a week, if all has gone well, the tubes may be removed, the granulating surfaces of the dorsal incision scraped, and the silver sutures drawn tight. In this way I have saved much time without increasing the danger of periproctitis.

It is needless to say that at every step in this operation the most complete antisepsis should be observed; for these cases die, when they do die, of septic periproctitis oftener than from all other causes combined. After the operation a large and perfect absorbent antiseptic dressing should be employed, and opium should be given freely with absolute milk diet to confine the bowels for at least a week. Should the bowels move involuntarily, so as to make the removal of the first dressing necessary, or should there be any rise of temperature, the wound may subsequently be treated as an open one and reliance be placed upon thorough irrigation. Should there

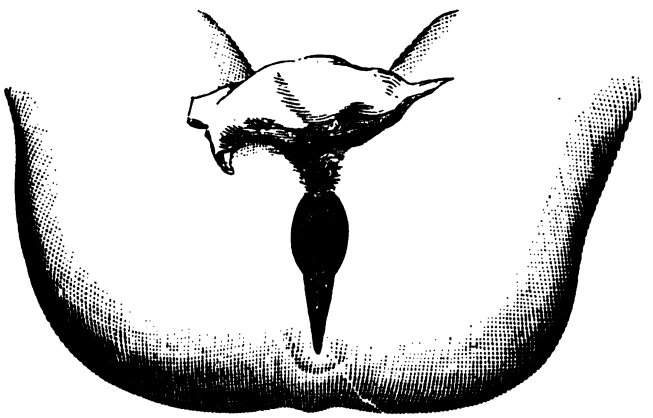

FIG. 9 (Allingham).

be chill and an alarming rise of temperature, all sutures should be cut, the parts opened widely up, and irrigation with weak bichloride or salicylic acid solutions used to reduce the temperature; but this accident has never happened to me.

The operation thus described may be modified in many ways according to the nature of the case.

The disease may involve the sphincters, in which case the deep dorsal incision should be made by entering the bistoury behind the anus through the skin between it and the coccyx. Two semicircular incisions should then be made through the skin which together surround the anus, meeting in the perineum in front and in the dorsal cut behind (Figs. 9 and 10). The diseased gut and sphincters should then be dissected out as a cylinder as in the former case. The operation is no more

serious than the other, but there will of course be no sphincteric power after the patient recovers, though there may not be any trouble from incontinence.

The disease in other cases may consist in a circumscribed nodule in some part of the rectal pouch which must be removed without any attempt to remove the gut as a cylinder. This operation is apt to be more difficult and bloody than the method already described. The dorsal incision which is the key to all these operations should be made as in the first case. The mass must then be attacked boldly and extirpated as quickly as possible. There will be no time for careful dissection in such cases. It is better to remove too much than

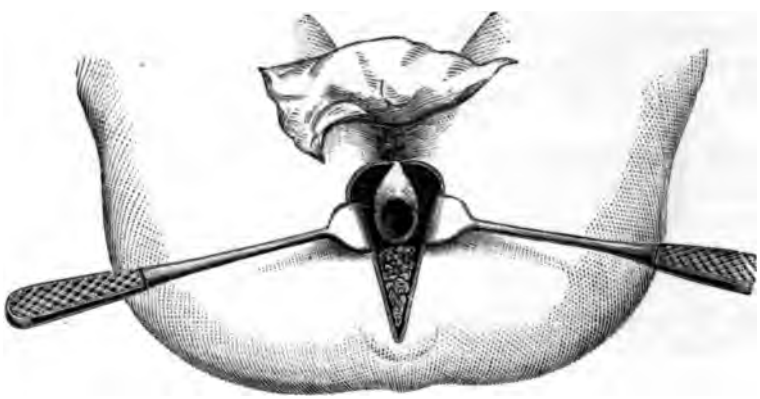

FIG. 10 (Allingham).

too little, and bleeding must be disregarded till the diseased mass is removed by a few bold strokes with knife or scissors.

In my first operation of this sort—a case of ulcerated epithelioma at the level of the prostate on the anterior wall of the gut—I encountered a bleeding which was very startling. All went well till after the dorsal incision was made, and I attempted to circumscribe the disease with a sort of limiting useless incision not much deeper than the mucous membrane, which was intended as a guide for the amount of tissue subsequently to be removed by a careful dissection. Before this plan of future work could even be mapped out, the bleeding was so profuse as to render its instant control absolutely necessary; and never before or since have I abandoned an attempt at graceful surgery and simply extirpated a mass of

cancerous tissue with the same celerity. The moment the disease was out the bleeding was completely under the control of pressure by a few sponges. I mention the case simply to illustrate as forcibly as possible that the secret of success in extirpation of the rectum is to remove the diseased mass as speedily as is possible, and to control the bleeding by pressure during the operation and afterward till ligatures can be applied. In all my experience in operations of every sort upon the rectum I have never seen a case of hemorrhage which could not be effectually controlled by direct pressure properly applied.

There is one after-consequence of these operations which must be carefully guarded against in the treatment, and that is cicatricial contraction. Of course the substitution of a cicatricial contraction for a malignant occlusion is a great gain; but even the cicatricial contraction may be in great measure avoided by proper care. As soon as such contraction begins to manifest itself, say in three or four weeks after the operation, the patient must be instructed to use the short bougie already described in speaking of dilatation. One of ample size (Nos. 8 or 9) should be chosen and introduced daily, being left in for several hours. I much prefer having the patient introduce them on going to bed and leaving them in all night. Generally they will cause no inconvenience, and the patient will not be conscious of their presence. By this means contraction may either be entirely prevented, or may be so limited as to do no harm.

Kraske's Operation.

The various operations which are included under this general head are all designed to effect an entrance into the cavity of the pelvis by an incision at the left side of the sacrum. By such an incision the entire rectum may be removed without interference with the sphincters, and many of the more difficult operations upon the female genital organs may be performed in addition. The operation upon the rectum may be either of the nature of an amputation or a resection.

There have been several modifications of Kraske's original method, but all of them may be reduced to two general plans. The first is merely an enlargement of the incision already de-

scribed for exsection, upward through the left sacro-sciatic ligament, combined with amputation of the coccyx and the removal of the end and left border of the sacrum. The other consists in approaching the disease from behind instead of below. The incision in this case is made from the middle of the sacrum to the tip of the coccyx reaching down to bone. The soft parts on the left side of the incision are then detached, the left sacral and coccygeal ligaments are divided as high up as the third sacral foramen, and the coccyx is removed. If still more room be necessary, the sacrum may be chiselled away on a line from the third foramen down to the tip, and the lower sacral vertebræ may be removed. The first incision is best adapted to cases involving the anus where the whole rectum has to be amputated; the second to actual resections of a part of the rectum with union of the divided ends. In this operation the peritoneum is of necessity opened, and it may be left so after the upper end of the gut has been drawn down, a drainage tube being inserted into the peritoneal cavity and the wound packed with iodoform gauze; or the cut edge of the peritoneum may be stitched to the serous surface of the sigmoid flexure as Schede has proposed. The divided ends of the gut are united more or less closely by sutures, and where the whole of the anus has been removed the end of the gut has in some cases been brought to the surface at the upper limit of the wound, and an artificial anus established in the sacral region.

This is not a place to go into an elaborate study of the statistics of this operation, nor, as yet, are these statistics of great value. Suffice it to say that they are steadily improving, but are still much worse than those of the operation previously described, as would naturally be expected. What has been thoroughly established is that the entire rectum and anus may be removed by a rapid operator by this method in about twenty minutes, and that a fair proportion of the cases recover with more or less permanent disability in the way of cicatricial contraction, incontinence, and fæcal fistula in the sacral region. The operation has certainly earned for itself a permanent place in the surgery of the rectum; and the length of life after it when patients recover seems fully as great as after the lighter operation. In none of my own cases has it seemed applicable for the reason that in all in which such an

incision would have been necessary to remove the disease, the adjacent structures have been so much involved that I preferred colotomy.

Extirpation of eight inches of the rectum where the disease involves only the rectum may be proper; but extirpation of rectum, prostate, and cancerous peritoneum is a different matter, and is an operation which I have never yet been ready to attempt. I have, however, practised the dorsal incision in several cases for the sake of better attacking deep recto-vaginal and other fistulæ and have been surprised at the ease with which the disease could be approached.

Colotomy

It will be seen at once from what has preceded that the field of this operation has been greatly encroached upon by the operation of excision; and yet, in other directions, it has been increased. It is easy to state in a general way the class of cases to which colotomy is best adapted. They are: First, the old and incurable cases of non-malignant ulceration, stricture, and fistulæ which are threatening life either by exhaustion or obstruction. Second, the cases of obstruction from pressure outside of the bowel, as in cancer of the pelvis, or old pelvic inflammation, and cases of intestino-vesical fistula. Third, the cases of cancer of the rectum in which excision is for any reason contra-indicated.

My own series of inguinal colotomies illustrate nearly all of the different classes of cases calling for the operation, including as they do cases of cancer with vesico-intestinal fistula; extensive non-malignant ulceration and stricture; acute obstruction by pressure; and the ordinary cases of malignant stricture. Nearly all have been satisfactory in prolonging life and relieving pain. In one I operated upon a gentleman whose rectum and pelvis were filled up with cancer, on his eightieth birthday. He had been told a year before that a colotomy would "eventually" be necessary, and when I was called upon to do the operation he was very near the end. After consultation I expressed my willingness to operate should the patient and family physician wish it, but declined to go further than this. I did operate, the patient did well till the bowel was finally opened on the third day and two

large fæcal passages had occurred, and then he sank quickly and died. I have never attributed this death to the operation. All that can be said of the operation is that it failed to prolong life. The patient was liable to die at any moment, in fact very nearly died upon the table. The operation was done with the least possible shock and was entirely completed in seventeen minutes from the time of the incision, and yet in spite of it he died. The attempt to prolong life was a desperate one and it failed, but there was no proof that it shortened it by a single hour.

Another of my cases was unsuccessful, but from no fault of the operation. The patient was over sixty, and much exhausted with the cancerous disease. When the abdomen was opened it was found partially filled with serum; the intestine was greatly congested, and the entire mesentery was infiltrated with cancer. There were no distended coils of gut, both large and small bowel being empty and contracted. It was with great difficulty that a piece of the sigmoid flexure could be stitched into the abdominal incision so closely was it bound down by cancerous infiltration of the mesentery, and a loop of small intestine which also appeared in the wound was only a trifle more movable. The large intestine was chosen and with difficulty sutured, the muscular layer being very friable. The patient did well for forty hours, when severe vomiting began and the temperature steadily rose to 105° with signs of collapse. The wound was examined and found in good shape; the bowel was incised but there was no escape of gas as is usual, and only a small quantity of fæces was found by introducing the finger into the proximal end. Death followed in a few hours with all the symptoms of collapse, and on opening the abdomen a complete obstruction with a gangrenous loop was found in the large intestine at the splenic flexure. The obstruction was due to a band of cancerous mesentery which had caused a sharp flexure in the gut, which flexure was completely obstructed by a small scybalous mass. Although the obstruction had been fatal in less than twelve hours, there was no great distention of the large intestine above the obstructed point; and though I had opened the gut as soon as the vomiting began, under the impression that the symptoms might be due to the complete obstruction caused by the operation, the failure to find any obstruction at the

wound, joined to the fact of a temperature of 105°, led me to suppose the patient dying of septic peritonitis.

A second opening of the abdomen might have saved the patient's life for a few weeks, but the sudden and complete collapse, and the already known condition of the abdominal contents, seemed to contra-indicate further surgery.

Such cases as these in no way militate against the general good results of the operation we are considering.

Regarding colotomy there are a few general considerations to which it may be well to call attention.

It is not a dangerous operation when done under anything like favorable circumstances, that is, before the sufferer is in the last stage of the disease and exhausted by intestinal obstruction or by suffering. Cripps very justly calls attention to the worthlessness of statistics on this point as made from a large number of separate cases by individual operators; for the mortality of the operation, as with extirpation, must always bear a very close relation to the skill and experience of the operator, and unsuccessful cases do not find their way into print. For himself he reports forty-one cases with one death.

As to the benefits arising from the operation, too much can scarcely be said. That it prolongs life by the relief of pain, the prevention of obstruction, and retarding the growth of cancerous disease, is beyond question. That it substitutes in many cases a painless death for one of great agony is also indisputable. My own objections to the operation were at one time deeply rooted, but they have been entirely removed by seeing one or two cases in which stricture had been left to its own course and termination in complete obstruction and rupture of the gut; and by seeing the amount of relief which has followed an artificial anus. The idea that it is as well to let a patient die as to subject him to a colotomy has no supporters among surgeons who have had any experience with these cases. Indeed I think that the practitioner who to-day sat by and allowed a patient to die of obstruction because of any sentiment against this procedure would hardly be held blameless. I can only say that, after trying every other means of treatment and being obliged to admit the fruitlessness of them all, I have come with most others to admit the great benefits of colotomy, and have never performed it in any case

in which either the patient or myself has afterward regretted it. This is exceedingly well exemplified in one of my patients upon whom I did the operation for non-malignant disease. The rectum has so far healed that I have offered to close the artificial anus; but she will not consent. The memory of her old sufferings is too vivid and her present comfort too great.

There can be no argument in favor of colotomy so strong as a single experience with a case of cancer of the rectum left to its own course and termination in fatal obstruction; and I think that no matter how strong one's prejudice against an artificial anus may be, a single case of this kind will convert him. There is no more painful death, and no class of cases in which the surgeon appears at a more hopeless disadvantage. I have successfully combated several cases of serious obstruction by medical treatment, and even in almost complete obstruction of the rectum by stricture I have prolonged life till the patient died of other causes; but I know now that an early colotomy would have been much better surgery; and I shall never cease to regret one case in particular in which I attended a patient with cancer of the prostate from its first discovery to its end in rupture of the caput coli. At the autopsy there were secondary deposits in the liver and mesenteric glands, and the abdomen was partially filled with fluid, so that it was evident that even colotomy could not long have prolonged life; but it would at least have given a less painful death.

Colotomy should not, however, be looked upon merely as a means of preventing obstruction or of overcoming it when actually present. The operation fulfils other indications, and though not a dangerous one when done early, the mortality is greatly increased by waiting till obstruction has set in. Again delay may cost a patient his life, as I have reason to know in my own practice. The patient was a young physician with non-malignant stricture and ulceration. I examined him under ether, hoping to reach the stricture and divide it, but found that the disease extended too high up for such treatment. Colotomy was recommended and assented to, but as the man was no worse than he had been for many months, there seemed no great hurry, and the operation was delayed. For a long time he had been able to have a passage only by the aid of strong cathartics; and it was his custom to take these on Saturday night and devote Sunday to unloading the

bowel. As he was a physician and an intelligent observer of his own case, I saw no harm in allowing him to continue the practice a few weeks longer, but the result was disastrous. He took his medicine once too often, the distended gut gave way, and he died of fæcal extravasation.

The hour when a chronic obstruction will change into a fatal condition can never be foretold; and after acute obstruction has occurred the dangers of a colotomy are greatly increased.

If colotomy is to be done it should be done early in order that the patient may be spared as much pain and the growth of the disease be delayed as long as possible. It should be recommended in all cases of non-malignant stricture and extensive ulceration which have advanced beyond the point where proctotomy and dilatation can give relief. In malignant disease the chorice between colotomy and excision may be more difficult to make. All cases manifestly beyond the reach of excision should be operated upon by colotomy at once; but each surgeon must be the judge of what cases come under this category and of how much danger is to be incurred for the hope of cure which excision offers.

The range of applicability of colotomy to the treatment of non-malignant affections has been greatly increased by the fact that the opening can be so made as to admit of its easy subsequent closure should it be advisable. This is a fact which often gives great comfort to the patients and induces them to consent to what might otherwise be refused.

Regarding the choice of operation between the inguinal and lumbar region, I can hardly imagine any case in which the old lumbar operation is preferable to the inguinal. The question has been much discussed, and recently Bryant with his one hundred and four cases has said all that can be said in favor of the lumbar incision. I can see no reason from his arguments why the present decided preference for the front operation is not well-founded, except possibly his statement that controlling pressure by a pad can be more firmly applied in the other incision, and I have found no difficulty in securing this pressure after the inguinal operation. As regards ease and certainty of performance, the subsequent cleanliness of the patient, and the ability to care for the opening, all the advantages are in favor of the inguinal opening. The dangers

of the two operations are about the same, as in the majority of cases the peritoneum is opened in both alike.

In performing the left inguinal operation no particular previous preparation of the patient is necessary. Many of them are not in condition to have the bowel thoroughly emptied by a cathartic; nor is there anything to be gained by doing so. The operation often has to be done on very short notice, and sometimes in the midst of complete intestinal obstruction.

The abdomen should be shaved and thoroughly cleansed on the day before the operation, if possible; and should be again washed with bichloride solution and ether at the time of the operation. It should then be covered with towels wrung out in warm carbolic solution at all parts except where the incision is to be made. It is needless to say that the comparative immunity with which the abdomen may be opened to-day is almost entirely due to antisepsis, which here should be of the most perfect kind.

The incision which I practise is the one used by Cripps and shown in the cut, except that I do not find it necessary to make my incision quite as long as he has figured (Fig. 11). An imaginary line is drawn from the anterior superior spine to the umbilicus. The incision should cross this at nearly right angles and should be an inch and a half distant from the anterior spine. The incision should be two inches in length, and it may be made an inch or two higher or lower as the operator prefers. If there be any reason to suppose that the disease involves the sigmoid flexure, it is well to make the incision higher up; and in this way, and by pulling down the upper end of the gut, the opening in the latter may be brought very near to where it would be in the lumbar operation.

The incision is carried down on a director as in all laparotomies till the peritoneum is reached, and before this is opened the cut surface must be thoroughly dry so that no blood will enter the abdominal cavity. As a rule no vessels will need tying, and after a few minutes' pressure with a towel the peritoneum may be opened on a director to the length of the cutaneous incision.

Usually a coil of gut presents at once in the wound, and this must be carefully examined to decide whether it is the part wanted. In the majority of cases it will be large intes-

tine and may be fastened at once into the wound, but this must not be taken for granted without examining for the longitudinal bands of muscular tissue or the *appendices epiploicæ* which are characteristic of the larger bowel.

If it be found that the presenting coil is small intestine it must be replaced and another coil brought up with the finger

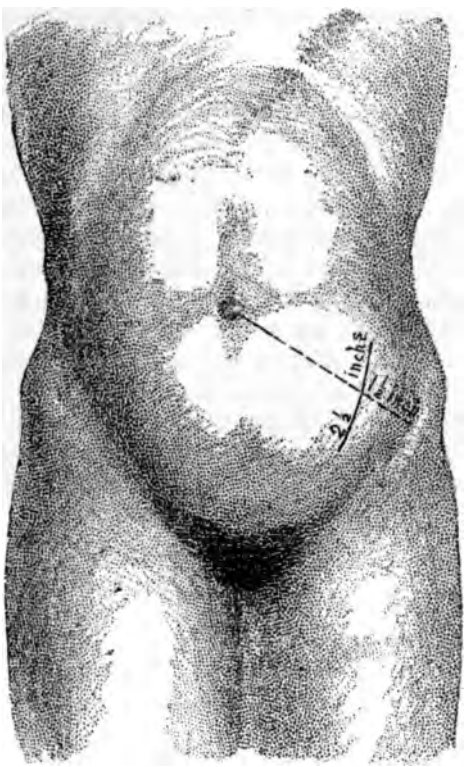

FIG. 11.—Incision in Inguinal Colotomy (Cripps).

from the brim of the pelvis. When the gut is much distended, difficulty may occur at this stage of the operation from protrusion, and the coil may require considerable pressure to keep it in the abdomen. No violence must be used, for a distended colon in a case of obstruction is often much thinned, and liable to rupture with slight violence. The protrusion can usually be easily managed by the pressure of a flat sponge or the closure of the wound with the fingers.

The selected coil is next to be drawn downward till it is held firmly by the mesentery above, and fastened to the edges of the wound in this position. In several of my later cases I have used a hare-lip pin, as the first step in fastening the gut, and I am much pleased with the results. The pin is passed under the coil at a point nearer the lower than the upper end of the wound in the following manner.

It is entered through the skin at the junction of the middle and lower third of the incision and half an inch from the edge, passed through the edge of the parietal peritoneum on that side, then through the mesentery close to the gut or through the muscular wall of the gut itself at a point corresponding to the attachment of the mesentery, then through the edge of the parietal peritoneum on the opposite side, and finally out through the skin on the side opposite its entrance.

By this simple manœuvre several important steps in the operation are accomplished at once. The gut is firmly secured in the required position so that it cannot be displaced by the patient should straining occur under the anæsthetic or after, and all the rest of the operation is rendered easy. Again, the sharpest possible spur is formed in the posterior wall of the gut, at the junction of the middle and lower thirds.

The gut is next stitched to the edge of the wound all around, each suture being made in the following manner (Fig. 12). A small, round, slightly curved needle is used, armed with fairly strong silk. The needle is passed through the skin an eighth of an inch from the edge of the incision, then through the cut edge of the parietal peritoneum at a corresponding point, then through the muscular wall of the gut. Care must be taken not to perforate the whole thickness of the intestinal wall so that fæces may escape through the puncture, and yet sufficient of the wall must be included in the stitch to secure it firmly. When one of the longitudinal bands comes in the right place or can be brought there, it is well to pass the sutures of one side through this band for additional strength. The sutures should also pass well back toward the mesenteric border of the gut in order that at least two-thirds of the circumference may be outside of the wound when all of the sutures have been passed. Each suture may be tied and the ends cut off as it is passed.

Generally about a dozen sutures are sufficient to give close

approximation. If for any reason the gut is to be opened at once, this number may be increased by three or four for additional security. The wound is then dressed first with a piece of protective, then with a layer of wet bichloride gauze, then with absorbent cotton, and, finally, with a broad obstetrical bandage. The protective is important, for much lymph will be thrown out around the wound during the first day, and the gauze, if put next to the wound, will be found so closely matted down as only to be removed with great difficulty.

The dressing thus applied need not be disturbed till the

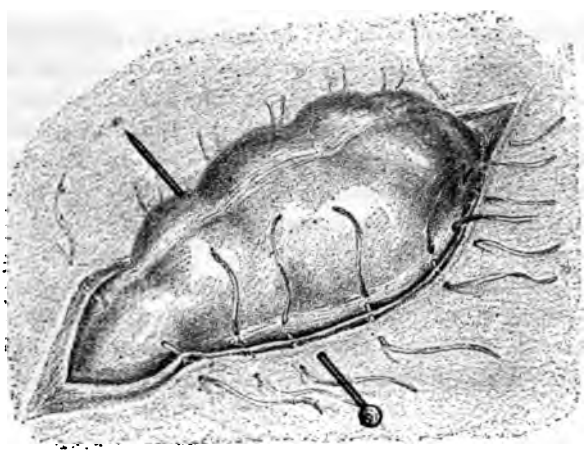

FIG. 12. (After Cripps.)

end of the third day. No opium need be given unless there be some special indication; and the patient should be fed upon milk.

At the end of the third day, and much sooner should the patient be suffering from obstruction, the operation may be completed. The provisional union of the two serous surfaces which shuts off the peritoneal cavity occurs in a few hours; and with the hare-lip pin to support the gut and hold it immovable, the gut may be opened without waiting for absolute union. The operation is completed by incising the gut longitudinally with a sharp bistoury, and paring down the edges with scissors to within a third of an inch of the skin border. No ether is necessary and no pain will be experienced. There is always a free oozing of blood for a few minutes, but it is

seldom necessary to tie anything. The pin should not be removed till three or four days later, and the sutures may be left to work their own way out.

From the nature of the operation as thus performed it is evident that when the convex surface of the loop of gut has been cut away, two openings into the lumen of the bowel will exist—a large one passing into the upper segment and a smaller one into the lower. Between these openings there is a sharp spur formed by the posterior border of the gut where it has been sharply bent over the pin. This arrangement has always in my experience been effectual in preventing any passage of fæcal matter from the upper, larger opening, into the smaller, lower one—a thing which, when it occurs, detracts greatly from the advantages of the operation.

There is a great advantage in all cases in leaving the distal end of the gut open at both ends as is done in this operation, for by inserting a syringe into the wound the rectum may be thoroughly washed out as often as there is any accumulation of discharge.

In non-malignant disease it is well in the operation to preserve as much of the circumference of the gut intact as possible, in case it should in the future be thought advisable to close the artificial anus. The only difference in operating to secure this end is to include less of the circumference of the gut in the row of sutures—making the opening only large enough to give a free outlet.

In some cases after the operation an annoying prolapse of mucous membrane will occur from the upper segment.

This has never been an element of trouble in any of my cases, and I attribute the fact to the drawing down of the upper part of the coil firmly before attaching it to the skin.

After the operation the action of the bowel may be left to nature. Sometimes during the operation scybalous masses may be felt in the sigmoid flexure and these are an additional indication that the large bowel is under the finger. If possible I always prefer to have these masses above rather than below the point of gut to be opened, for their evacuation is then easy; and when in the distal portion they cause pain by their presence and may have to be washed down and out with the syringe. The first evacuation may occur immediately the bowel is opened or may be delayed several days or even a

week. In the latter cases there has probably been chronic dilatation and obstruction, and some time is required for the muscular wall to recover its tone.

With regard to the artificial anus, Cripps, I believe, has reported one case of sphincteric action, but it is safer not to promise so favorable a condition. In none of my cases have I seen anything that could properly be called voluntary control of the evacuations. This does not, however, imply that these patients are troubled with a constant involuntary evacuation of fæces, for such is not the case. I have one patient, indeed, who never has a movement more than once a week and only after a laxative. When the patient has diarrhœa there will be a constant discharge of fluid fæces till the diarrhœa is checked; but under ordinary conditions the bowel can be trained to move at a regular time each day; the patient is easily able to care for the evacuation, and is then comfortable for the balance of the day. Both men and women are able to attend to their duties and enjoy life.

In the way of a dressing a truss may be made similar to the ordinary one for inguinal hernia which will cause sufficient pressure to prevent the escape of solid fæces. Most of my cases, however, are more comfortable with a wide bandage around the waist, holding a piece of sheet lint upon the opening except when taking active exercise. The truss should only be worn during the day.

General Treatment.

In the treatment of non-malignant stricture and ulceration I have for some years back been using the tincture of arbor vitæ in large doses for the specific effect it seems in some cases to exercise upon diseased mucous membranes. Where there is much ulceration in connection with the stricture this may be continued for many weeks with occasional interruptions, and should be combined with local applications to the diseased surface. After division of the stricture, these agents should be used while the subsequent dilatation is being practised; and under their combined influence the discharge and pain will often either entirely cease or be greatly diminished.

In malignant disease I have also used arbor vitæ internally, but have seen no effect from it.

Much comfort may be given patients with stricture by a proper regulation of the diet. The pain of the disease is in great measure caused by defecation and the object should be to relieve the rectum of as much work as possible. This is best acomplished by a fluid diet of the most concentrated form. Milk, strong beef soups, and eggs give the greatest possible nourishment with the smallest residue, and on these the patients should live. In this way constipation is produced and this is best relieved by the use of the long tube every day or every alternate day. The injections must be carefully directed by the physician and should be administered through a good-sized soft catheter passed above the stricture. They should consist only of warm water or of olive oil. A gentle laxative such as the compound licorice powder may be also given at night if it be necessary. The injections should be large, as much fluid being thrown up as the patient can well bear, and when this is evacuated, as it will be at one sitting, the bowel above the stricture will be emptied and the patient free from discomfort.

Opium is a thing never to be denied these sufferers from malignant disease, but to be employed so as to obtain the greatest amount of good. Care must be taken not to cultivate an opium habit, for when once this is formed the craving for the drug will induce the patient to counterfeit pain; and before the end of the disease is reached all benefit to be derived from the anodyne is lost. If these patients are taught the use of the hypodermic syringe, it is very likely to be abused.

TABLE OF CASES.

Whole number	96
Males	51
Females	45
Cancer	44
Venereal	15
Non-venereal	25
Doubtful (non-malignant)	6
Congenital	3
Due to pressure	2
Spasmodic	1

TABLE OF OPERATIONS.

Proctotomies.

No.	Date.	Name.	Sex.	Age.	Remarks.	Result.
1	1878	H.	F.	26	Tight venereal stricture; internal incision without drainage followed by pelvic peritonitis. Patient in good condition four years later....	Recovery.
2	1880	F.	F.	30	Slight stricture; internal incision. Case lost sight of a month later....	Recovery.
3	1881	R.	F.	32	Non-venereal stricture and fistulæ; external operation. Patient greatly relieved and in good condition five years later.....	Recovery.
4	1881	P.	F.	31	Extensive stricture; external operation. No after-history.....	Recovery.
5	1881	Z.	F.	27	Tight and extensive stricture, probably venereal, external operation. Six months later no recontraction.	Recovery.
6	1882	B.	M.	40	Old venereal stricture; external operation. Good condition one year later.....	Recovery.
7	1882	P.	F.	38	Old venereal stricture; external operation. Recontraction from neglect of bougie six months later.....	Recovery.
8	1883	H.	F.	54	Extensive malignant stricture; external operation; severe secondary hemorrhage. Death eight months after operation.....	Recovery.
9	1885	P.	M.	50	Old syphilitic stricture; external operation Result good as long as bougie was used.....	Recovery.
10	1886	D.	M.	30	Extensive malignant disease. Died on seventh day with symptoms of peritonitis and exhaustion	Death.
11	1888	L.	F.	34	Non-malignant stricture; internal operation with drainage. No symptoms two years and a half later, except tendency to contract when bougie has not been used for some months	Recovery.
12	1888	R.	M.	46	Non-malignant stricture and fistulæ; internal operation with drainage posteriorly, and complete division of stricture with sphincters through a fistulous track anteriorly.....	Recovery.

Proctotomies.—(Continued.)

No.	Date.	Name.	Sex.	Age	Remarks.	Result.
13	1888	A.	F.	34	Malignant stricture and intestinal obstruction; external operation. Death from shock in 8 hours	Death.
14	1889	B.	M.	28	Stricture from hæmorrhoidal ulceration; internal operation with drainage. No recontraction one year later.....	Recovery.
15	1889	P.	F.	35	Slight stricture; internal operation with drainage. No subsequent treatment. Case lost sight of after three weeks.....	Recovery
16	1890	H.	M.	57	Very extensive non-malignant stricture of nearly 30 years' standing. Under ether the disease was found to extend too high for safe posterior division, and the upper portion was subsequently treated by dilatation. Four months after operation the patient was having one natural daily passage, was using No. 11 bougie without pain, and was more comfortable than for many years..	Recovery.
17	1890	N.	F.	25	Tight non-malignant stricture; internal incision and drainage. Now under treatment.....	Recovery.

Inguinal Colotomies.

1	1888	McK	F	50	Acute obstruction from pressure of cancerous mass opposite promontory of sacrum. Intestine much congested and abdomen full of fluid. Lived 18 months.....	Recovery.
2	1888	C.	M	58	Extensive non-malignant ulceration, stricture, and fistulæ. Great relief. Alive two years later.....	Recovery.
3	1889	C.	M.	31	Intestino-vesical fistula and cancer of the rectum. Immediate relief of vesical symptoms.....	Recovery.
4	1889	P.	M.	49	Extensive malignant disease. Immediate relief to worst symptoms. Alive one year later.....	Recovery.
5	1889	M.	M	80	Extensive cancerous obstruction and great exhaustion. Death 52 hours after operation of exhaustion, without shock.....	Death.

Inguinal Colotomies.—(Continued.)

No.	Date.	Name.	Sex.	Age.	Remarks.	Result.
6	1889	S.	M.	35	Cancerous stricture; operation followed by sufficient relief to allow patient to get out of bed and into the street for exercise. Alive six months later.....	Recovery.
7	1890	R.	F.	42	Rectum occluded by pressure of pelvic abscess, added to old stricture and ulceration. One month after operation patient had gained 20 pounds in weight, and was more comfortable than at any time since disease began.....	Recovery.
8	1890	F.	F	60	Tight cancerous stricture and chronic obstruction; abdominal glands all involved; 48 hours after operation patient suddenly taken with symptoms of collapse ending fatally in a few hours; autopsy revealed an obstruction by a mass of cancerous mesentery at the splenic flexure of the colon which had occurred since the operation.....	Death.

Excisions.

1	1884	M.	M.	55	Excision of cancerous mass on anterior wall of rectum three inches from anus, involving peritonitis. Death 52 hours after operation from exhaustion.....	Death.
2	1887	W.	M.	64	Non-malignant stricture and large polypus filling rectum. Result good as regards recontraction and sphincteric control.....	Recovery.
3	1887	F.	M.	69	Circumscribed cancerous growth on anterior wall opposite prostate....	Recovery.
4	1889	B.	F.	24	Extensive non-malignant stricture; complete circular resection; subsequent operation for incontinence successful. No recontraction.	Recovery.
5	1889	R.	F.	38	Complete circular resection for cancer; vagina opened; return of two nodules in recto-vaginal septum 6 months later. Second operation for these also successful.	Recovery.

Excisions.—(Continued.)

No.	Date.	Name.	Sex.	Age.	Remarks.	Result.
6	1890	R.	M	58	Non-malignant stricture: complete circular resection. No recontraction, and but slight sphincteric control.....	Recovery.
7	1890	P.	M	50	Cancerous stricture with chronic obstruction; complete circular excision; gut above the disease very much distended and ulcerated. Collapse from rupture of sigmoid flexure above the operation fatal in 12 hours.....	Death.

THE INFLUENCE

OF

HEREDITY ON ALCOHOLISM.

BY

PAUL SOLLIER,

Resident Physician in Paris Hospitals.

WITH INTRODUCTORY REMARKS BY

DOCTOR BOURNEVILLE,

Physician to the Asylum at Bicêtre, France.

THE INFLUENCE OF HEREDITY ON ALCOHOLISM.

CHAPTER I.

HISTORICAL REMARKS.

If the progress in any given branch of pathology could be estimated by the number of works which have been written on it, the study of alcoholism should be complete.

Why is it not? Because the solution of this question, like a great many others, does not depend solely upon the physician. Some of the elements necessary for its solution must be derived from the information furnished by the families of the patients. The physician may be at fault: he may be a careless or an inaccurate observer, or he may not know how to question effectively. Or else the physician, though competent, may be led into error by the relatives, who convey incorrect information, whether wilfully or through imperfect knowledge of the patient and his parents.

Hence the great difficulty of research which rests upon exhaustive study of genealogical memoranda and the influences of heredity. Hence, too, the utility, the advisability, for learned societies to stimulate by prizes and rewards the researches of young, industrious physicians, thus to accumulate data for more and more precise conclusions upon the various branches of neurology in mental as well as in nervous pathology, these being so intimately connected that they cannot be subdivided.

The Medico-Psychological Society, acting in this spirit, offered "The Influence of Heredity on Alcoholism" as subject

for competitive essays for the Aubanel Prize. From among a number of competitors, the essay of M. Sollier was adjudged worthy of the first prize. We have accepted the agreeable duty of introducing it to the reader.

In treating such a question, statistics are of paramount importance, in their bearing, not only on the heredity of alcoholism in itself, but also on the genealogy of the families of the degenerated. M. Sollier has based his discussion upon the history, recorded as carefully as possible, of 350 families, one of the members of which was at the time, or had been, at Bicêtre, in the wards of the Epileptic and Idiotic Children.

These documents are of capital importance; for the subject presents itself, not as a clinical study, but as an investigation of one of the causes which influence alcoholism. We shall not follow the author in his researches chapter by chapter; we shall only call attention to some of the ideas which stamp his work with a special individuality.

M. Sollier has peculiar views concerning the mutual relations of dipsomania, and alcoholism by heredity. According to him, there is between these two pathological conditions merely a difference of intensity in the impulse, a difference of excitation which effects a varying reaction that permits the one to eliminate the ingested alcohol and leads the other to intoxicate himself. Thus, for each of the morbid conditions a particular course results and the two become more and more divergent in their sequels.

M. Sollier divides alcohol drinkers into three classes. 1. Dipsomaniacs (hereditary) who are not always intoxicated. 2. Acquired alcoholics (non-hereditary) who are always intoxicated. 3. Hereditary alcoholics who are both hereditary and intoxicated.

He endeavors to demonstrate that hereditary alcoholics have a greater tendency to be affected with alcoholic delirium than ordinary (acquired) alcoholics. While investigating this point, he directs attention to the interesting fact, that authors treating of alcoholic delirium notice the hereditary antecedents of the patients so incompletely that at present it is almost impossible to verify their influence, by any great number of proofs.

After having dwelt upon the modifying influence of heredity, which in the same family may develop different manifesta-

tions, M. Sollier proceeds to seek the determining causes of alcoholism by heredity, in predisposed subjects. In this study, he has endeavored to follow the patient in successive stages through life, keeping in view, the while, the principal social differences in both man and woman.

This chapter, which belongs to sociology rather than to medicine, leads to a practical medico-legal conclusion. The existence of alcoholism by heredity, considered as assimilable, in a certain measure, to dipsomania, would, in effect, lead to the admission, for a great number of alcoholics, of the plea of legal irresponsibility.

This investigation, bringing into strong relief the formidable consequences of alcoholism upon progeny, leads to another study—the research for means to lessen the evil. Drunkenness is an evil in itself; it is rendered worse by the nature of the spirituous drinks imbibed. Drunkenness in different degrees has existed from the earliest times in almost all nations; writings against it and remedies for it have been promulgated for more than three centuries; legal measures enacted for its suppression have not diminished it; it appears more redoubtable to-day than ever; and presumably, its deleterious effects are increased by the shameless adulterations and sophistications practised in the marketing of strong drink of all kinds.

How is this evil to be remedied? By the establishment of appropriate asylums, analogous to those in the United States of America; by more rigorous and close control and prohibition of sophisticated or adulterated liquors; finally by the unceasing dissemination, through all available channels, of knowledge concerning the terrible effects of drunkenness, not only upon the persons addicted to it, but also upon their progeny. Families of the better classes, more alive to their responsibilities and duties, would thus be led to inquire more particularly into the habits and antecedents, personal and hereditary, of the men intended as husbands for their daughters, and thus guard against unfortunate marriages.

The work of M. Sollier is well co-ordinated, easily followed in its developments, careful in its details, and confined to the subject proposed—"Heredity in Alcoholism." We recommend it to the particular attention of all persons interested in nervous and mental diseases.

Our subject, as we propose to consider it, embraces three inquiries:

1. Can alcoholism be transmitted by heredity?

2. If it is heritable (by heredity in similars), to what extent and in what manner does heredity operate?

3. Is heredity in similars the only form in which this agency intervenes in the production of alcoholism; or, may there not be also heredity in dissimilars in the transmission; and, under this last hypothesis, which are the affections that are most active in predisposing progeny or descendants to alcoholism?

The three principal divisions of our investigation will correspond to the three inquiries stated above, and we shall add a fourth division, in which we shall examine the concatenation and sequence of causes which drive persons predisposed to alcoholism into becoming alcohol-victims, inebriates.

Can alcoholism be transmitted by heredity?

The simple statement of the question inclines us to decide it emphatically in the affirmative, and to start from this affirmation in discussing the other questions based upon and flowing from it. We may the more readily assume this affirmative position at the start, because this answer to the question will be supported by constant evidence throughout the entire elaboration of our theme.

Nevertheless we prefer to establish from the beginning the basis of the claim that alcoholism is transmissible by heredity. In so doing we may pass in review the historical phase of the question, and try to do justice, as far as possible, to the contributions of other workers in the same field. Nowadays we are apt to forget the credit due to our predecessors for useful preliminary work, however unreservedly we may appropriate their results. I gladly avail myself of this opportunity to offer the only tribute we can pay to the talented investigators who have preceded us—our candid appreciation of their meritorious labors.

Historical Sketch.

All ancient authors, whether philosophers or physicians, who had occasion to speak of the propensity for strong drink, noted its transmissibility from parents to their offspring. But they attached no particular importance to the observa-

tion and regarded it merely as a curiosity. They considered it as but the transmission of a similarity of taste from one generation to another, just as might occur with any trait of character or special aptitude. They had no suspicion of the different factors which contributed to favor the development of this taste in the progeny. Especially they failed to discern the difference between the vice and the disease. To them the drunkard appeared vicious, not diseased. How could they possibly discern or recognize the difference between the two conditions? Alcoholism was unknown to them; and while they noted certain effects of habitual drunkenness upon the individual, they were almost entirely ignorant of its influence upon the species and, logically, of its primary conditions. Not until we reach the writings of Magnus Huss do we find recognition of alcoholism as a morbid entity, noted in nosological classification.

But let us look backward to the beginning of the present century and observe how the physicians viewed the question of the heredity of the propensity for strong drink, and try to follow the successive phases of the doctrine until the present time. In considering the several points suggested by this discussion we shall have occasion to weigh the opinions of such authors as have written specially upon the subject.

Gall admits the transmissibility of the propensity for strong drink, and cites the case of a Russian family in which the grandfather and the father died prematurely, victims to their passion. The grandson, at the early age of five years, manifested the most pronounced fondness for the same liquors.

Girou de Bouzareingue, in his book on Procreation (p. 227), says that he knows a family where this unfortunate fondness was transmitted from generation to generation through the mothers.

Esquirol is the first who considers habitual drunkenness sometimes as the result of a morbid longing and remarks that habitual drunkards are predisposed to nervous diseases. (Does not this apodict contain the germ of the idea that mental degeneration is an impelling cause of alcoholism?)

Louis, in his "Essay on Hereditary Diseases" (p. 41), refuses to acknowledge this especial heredity, and, with a singular self-contradiction, cites two cases in which the heritability of alcoholism appears unmistakable. The first of these is that

of the family of Voiture, whose father and one of whose brothers were passionately fond of high living and wine, in contradistinction from Voiture himself, who drank nothing but water ("History of the Académie Française." Elegy of Voiture. La Haye, 1688). The second case is that of a family, which Louis knew personally, in which the father and some of his children developed gout and fondness for strong drink. This observation is very interesting, if we bear in mind that gout belongs to the group of arthritic diseases, which has close affinities with the neuropathic type.

Prosper Lucas, however, from whose remarkable book on Natural Heredity (vol. I., p. 476) we take these examples, differs from Louis, and admits that the tendency to drunkenness may be transmitted by heredity.

Bruhl, Cramer, and Carpenter, in their works on alcoholism, throw little light on the subject.

It is Magnus Huss who coined the term "alcoholism," in his book on the physical and psychical disorders caused by the abuse of alcohol. Even this author only vaguely established its influence over the mental condition of its subjects. Nevertheless, thenceforth "alcoholism" came to be considered in its true light, as a morbid entity, with distinctly defined symptoms.

Up to that time attention had been centred on the effects of alcoholism on the subject individually. Then Morel, with his grand idea of degenerations, took up this study where Huss had left it, and soon demonstrated that alcoholism is one of the gravest and most rapid causative factors of the physical and mental degeneration of progeny.

At the same time it was noted that many of the alcoholic subjects (permit us to call them "alcoholismics") were themselves degenerated, subjects of epilepsy, insanity, etc. It became evident, then, that it would be necessary to ascend higher in the genealogical tree than the individual under consideration, and to seek in preceding generations the cause of this degeneracy, as the direct origin of the alcoholism. Thus alcoholism was considered as the manifest result of the degeneracy of the individual, and this degeneracy was itself the consequence of heredity, as shown in the majority of cases.

But, as among the hereditary antecedents of these cases, among the defects of the procreators, no flaw was often to be

found, no deterioration except alcoholism, the inquirer was naturally led to consider that alcoholism itself might be transmitted by heredity in similars.

In the first class of cases, heredity creates in the progeny a feeble diathesis, incapable of resistance, and thereby favored the invasion and evolution of alcoholism. In the second class alcoholism itself procreates directly the predisposition to alcoholism in the progeny, just as dipsomania, kleptomania, and other neuropathic diseases may be transmitted by heredity. Since the promulgation of this theory, all writers on the subject have recognized this double influence in the genesis of alcoholism, viz., on the one part heredity in similars, and on the other, heredity in dissimilars. But this last class has been but little studied.

Most authors have studied more especially the progeny of the subjects of alcoholism—the alcoholismics. Among these they find new alcoholismics (cases of alcoholism by heredity of similars) and cases of all the psychical, intellectual, and moral degenerations developed with remarkable rapidity in the descendants of alcoholismic progenitors. The study of progeny of alcoholismics, carried sufficiently far, demonstrates clearly the heritability in similars; but it cannot be brought to bear upon heredity in dissimilars.

To appreciate the latter influence, we must trace the line of ancestral procreators. Analysis of these will lead us to know whether alcoholismics, exclusively, can procreate other alcoholismics, or whether other parentage, with developed neuropathic diathesis, may not also be capable and liable to engender alcoholismic progeny.

Let us now consult the opinions of modern and contemporaneous writers; we will collate these for their bearing on the problem concerning the heredity of alcoholism.

Thomeuf (thesis 1859), Contesse (thesis 1882), and Marcé, admit fully the heredity in question; but they do not insist upon it. Laségue establishes it distinctly, but he attributes the development of the disease principally to the idiosyncrasy of the contaminated individual. Lancereaux and Fournier, in their articles in the two dictionaries, suggest that in certain cases the proneness to alcoholic excesses is the result of an innate vitiated predisposition, and that habitual drunkenness is, in some cases, certainly the outgrowth of a morbid transmission.

[illegible] distinguishes two forms: viz. acquired and [illegible] alcoholism. But under the heading "hereditary [illegible]" he classes all the accidents which may be pro[illegible] progeny as attributable to the alcohol[illegible] the parents. We fear that if accepted in this general [illegible] the nomenclature would create lamentable confusion. [illegible] is to be preserved at all, its meaning should be [illegible] to alcoholism itself, when derived from the lineal [illegible] the subject, whether by heredity in similars or [illegible]. But in the hereditary alcoholism of Lan[illegible] we meet with everything, epilepsy, mental impair[illegible] [illegible] instincts, etc., everything in short, [illegible] alcoholism itself, which reappears only in a [illegible] the transmitted inheritance [illegible].

[illegible] were specifically characteristic of [illegible] accidents of hereditary syphilis are [illegible] syphilis themselves—the harm of the mis[illegible] [illegible]. But this is not the case. We, [illegible] limitation of the term "hereditary alco[illegible] [illegible] alcoholism which have received their [illegible] pathological condition of the procreators. [illegible] would suggest to drop the term as unnec[illegible] [illegible] would aid the clearness of science [illegible] numerous doubtful synonyms engendering [illegible].

[illegible] "Delirium Tremens," attributes a [illegible] hereditary predisposition in the develop[illegible] [illegible] and of delirium subsequently.

[illegible] Heredity in the Diseases of the Ner[illegible] [illegible] having demonstrated the analogy [illegible] delirium caused by intoxications [illegible] adds: "If there is analogy [illegible] reasonable to conclude that there [illegible] and that the intoxicated or poi[illegible] [illegible] by virtue of the special suscep[illegible] [illegible] temperament, which is delicate and [illegible] heredity exercises its influence. [illegible] the subject in a strong light, when [illegible] only upon subjects strongly pre[illegible] [illegible].

Taguet ("Heredity in Alcoholism," "Ann. Médic. Psycho.," 1877, Vol. II., p. 5) admits for alcoholism, as in all other diseases transmitted from procreators, a heredity of similars and one by metamorphosis, and dwells particularly upon the morbid manifestations produced by alcoholism of the procreators upon the constitutions of their progeny. He, however, considers alcoholism only in its entity, whether in the ascending or the descending generations. This manner of viewing the subject is more interesting from the sociological than from the medical standpoint.

Féré (on "Alcoholisables," Med. Soc. of the Hospitals) shows by two very marked cases the influence of heredity in the predisposition to the abuse of alcohol. Here arises a new point for study, heretofore only touched upon by other observers—not merely the proneness to the abuse of alcohol, but also the susceptibility to intoxication.

Laseigne dwelt particularly on the various degrees of susceptibility to intoxication in different individuals, and drew attention to the fact that, while there are cases of non-impressibility by alcohol, there are also subjects who pass under its influence with extreme facility and rapidity. Ball and the majority of authors also believe that the son of an alcoholismic or insane parent is vastly more sensitive to the physiological effects of spirituous drinks than other individuals.

We have found some very interesting inferences from the discussion of our present point in two recent theses, by Grenier and by Legrain. Grenier, studying the progeny of alcoholismics (thesis 1887), shows by numerous instances that weak-minded subjects are very much inclined to abuse of strong drink, and that from being at first hereditary alcoholismics, they become inebriates in process of development by the same sequence as their procreators. We see alcoholics not only generating feeble offspring, but implanting in them also the taint of alcoholism. Hard drinkers procreate hard drinkers in a notable proportion of cases—approximately one-half.

Legrain (thesis 1886), summing up the opinions of Magnan and his school, says: "If there be any two propositions that we have the right to formulate at the present day, the following are the two—1. Cerebral inferiority, the direct cause of excesses in strong drink, has its origin most frequently in heredity; that is, excessive drinkers are degenerates. 2. Al-

coholism is one of the most powerful causes of mental degeneration; that is, the sons of inebriates are degenerates. The relations between alcoholism and mental degeneracy are comprised within this terrible vicious circle, which is irrefutably traced out, and confirmed by innumerable, most eloquent medical observations."

And furthermore he remarks, "There are but few cases of degenerates, in the careful study of which we may not discover, somewhere, evidences of excessive addiction to strong drink. On the other hand, it is notorious that in the category of confirmed inebriates, we find their progeny to include cases of idiocy, imbecility, weak-mindedness, and various neuropathies, of which the most frequent is epilepsy."

In France opinion appears to be unanimous as to the heredity of alcoholism, if not in all cases, at least in a great number. But, outside of France, what opinion prevails?

The Academy of Medicine of Belgium has twice made "The effects of habitual drunkenness on progeny" the subject for competitive essays. If it be permissible to consider the papers presented for this competition as the expression of opinion generally current in that country, we may assert that the medical profession there consider heredity one of the most powerful causes of alcoholism, and admit also heredity in similars, and heredity with transformation. "Heredity with inebriety," says one of these essays, "is subject to the same laws which govern psychopathic and neuropathic transmission."

Such also is the opinion in Germany.

But it is more particularly in England and America that alcoholism is considered a hereditary disease. English writers almost confound habitual drunkenness with dipsomania, which last is incontrovertibly a heritable affection.

In America, Crothers, in particular, has advocated these opinions. They were, however, sufficiently prevalent in 1871 to receive the sanction of a convention of the numerous temperance societies existing in the United States, and to justify their adoption of the following propositions: 1. Alcoholism is a disease. 2. It has for its principal cause a constitutional susceptibility to alcoholic drinks. 3. This constitutional predisposition may be hereditary or acquired. ("Chicago Med. Journ. of Nervous and Mental Diseases," 1875.)

Crothers, who has excellent facilities for the study of all

questions relating to alcoholism, considers that there is no other disease which is more intimately connected with the prevalent physical and mental conditions of the human race. Inebriety, he says, is positively transmitted from one generation to another, and this diathesis or predisposition may be observed to extend through two or three generations. He goes even so far as to consider inebriety capable of becoming, at times, epidemic; bearing in this respect a resemblance to certain neuroses, and obeying some great psychological law as yet unformulated, drunkenness prevailing at certain periods with great intensity, and at others dying out; but reviving again after a certain lapse of time.

Thus, public opinion is unanimous that alcoholism may be hereditary. The degree of its transmissibility is the only ground for discussion. But the dogma is of recent adoption. We will briefly review the phases through which we have passed in reaching it. These form three stages:

First, and this covers the longest period, alcoholism, as now understood, was quite unknown. What was known, was habitual drunkenness. Its transmission from generation to generation had been observed; but this was regarded as a mere resemblance, in no wise remarkable between parents and their children.

Second. This period is one of transition. It corresponds to the great activity in the study of mental alienation which occurred in France at the beginning of this century. The frequent coincidence and other correlations of insanity, weak-mindedness, etc., with habitual drunkenness is established by observation. It is noticed that alcoholism is merely a precursor of insanity. Proneness to strong drink commences to be considered not simply a vice, but often the manifestation of a morbid diathesis. But opinion halts there; it does not venture to assert that it is an actual disease, still less to assume that it is a disease which is often hereditary.

Third. The culminating period commences with Magnus Huss and Morel, at about the same time, by a coincidence which often repeats itself in the evolution of ideas. The investigations and the work of the former of these observers furnished to the latter a solid basis for the superstructure of his learned, profound, and exact treatise on the degenerations occurring in the human species.

This advance movement initiated by Morel has constantly progressed. If it has not, as yet, extended largely our stock of theoretical knowledge, it has, at least, greatly multiplied the confirmatory evidences establishing the correctness of his general views. In this work Magnan and his disciples have been most notably industrious.

Assuming now, without hesitation, to adopt the dogma of heredity in alcoholism, we shall proceed to consider it in its multiple relations and details.

We shall commence with heredity in similars, which appears to us to be by far the most important; and then proceed to the consideration of such hereditary diseases as are capable of producing alcoholism in their descendants.

We have prosecuted our work without any preconceived theory. We have collected the largest number of facts accessible to us, and have collated them for study and comparision. We submit the findings which have appeared to develop themselves naturally. We claim for our work, if it has no other merit, at least the recommendation of sincerity.

Heredity in Similars.

This is the form of heredity which most authors have acknowledged in discussing the transmissibility of alcoholism. It is from the admission of this heredity that the question has arisen whether alcoholism itself, which may be transmitted in its own form, has not originated in some predecessor; and whether, instead of arising spontaneously, as appears to occur in some cases, it is not really the development of a predisposing inherited influence, differing more or less from itself.

Thus we are led from heredity in similars to heredity in dissimilars. This latter phenomenon is of less frequent occurrence and more complex analysis; it has, for this reason, received less studious attention from observers.

Before entering upon this advanced discussion, let us analyze the various views of those observers who have pronounced any special opinions for or against heredity in similars.

Davis ("Chicago Journ. of Nervous and Mental Diseases," 1875) says: "We admit that statistics show that the progeny of parents addicted to excessive use of alcohol have a special tendency to the use of strong drink. But before admitting

this tendency to be inherited, we should satisfy ourselves as to, 1st. Whether the mother, during the period she was suckling her child, did not indulge more or less frequently in alcoholic drinks, which passing into her milk, might have made some impression upon the child and given him the taste for them. 2d. Whether the parents, addicted to strong drink, did not give frequently to their children alcoholic beverages, as remedies, perhaps, for their ailments, just as they would administer them to themselves, for relief in similar cases." His very extensive experience will, he thinks, justify the conclusion, that in nineteen cases out of twenty, alcoholism, said to be hereditary, had been directly acquired by one of the channels just indicated. He admits, however, that the existence of alcoholism in one of the procreators tends to render the progeny more nervous, more impressionable to the action of alcohol.

This opinion is exaggerated and seems to us unsound. It presupposes the mother to have alcoholism, at least for a time, however short. But in the majority of cases this is not the fact, and the alcoholism generally comes from the father. It is not from the mother's milk that the child acquires his fondness for alcohol. Whatever influence his taste might have received from it, it seems unreasonable to admit that this impression of early infancy should lie in abeyance for eighteen or twenty years, before the fondness for alcohol manifests itself. As to the fact that parents addicted to strong drink do develop in their children the fondness for such drink, by giving them alcoholic beverages for one purpose or another, it is undeniable.

But alongside of this fact we must place another: that in countries where the habit prevails generally of giving brandy and cognate liquors in beverages to children, to aid their strength, to favor the process of dentition, to relieve various ailments, it is precisely the children of alcoholic parents who contract this fondness with the greatest readiness. It seems to us more reasonable to believe that the occurrence, though comparatively unimportant when viewed apart from surroundings, has served to awaken prematurely a latent predisposition implanted by heredity. Finally, the theory broached by Davis would, at best, apply only to a very small proportion of cases.

Thompson de Kapeln ("Archiv de Psychiatrie," vol. 17, 1886), in an essay on "Alcoholism and its Transmission by Heredity," has noted some interesting facts. As in many other diseases transmissible by heredity, the inherited predisposition in alcoholism does not, in some cases, develop into a disease until a somewhat advanced age is reached. Sometimes the descendants have no liking, or even have an aversion for alcoholic drinks, and proclaim it. Such subjects, generally robust and intelligent persons, as age gains upon them and their energies weaken, resort to drink to repair their wasting strength and lapse into alcoholism.

Taguet ("Heredity in Alcoholism," "Medico-psychological Ann.," 1877, vol. 2, p. 5) says: "Heredity in similars presents itself in two forms—the one a latent state, or one of abeyance, that needs example or imitation to awaken it into activity. In the other it bursts forth suddenly, unexpectedly, and inexplicably by any relation of cause to effect. Some persons come into the world drunkards as others are born criminals." Thompson notices this trait also, in common with other hereditary diseases, that it descends not only from father to son, transmitted by direct heredity; but that it may skip one generation and reappear in the succeeding generations.

This characteristic, which he indicates as a mere possibility, is stated to be constant by the author of one of the essays presented to the Academy of Medicine of Belgium ("Bulletins," 1874, p. 355). He says: "The author has been able to establish the remarkable fact concerning heredity in alcoholism, of the immunity of the immediate descendants and the manifestation of alcoholism in the second generation, similarly to what occurs in scrofula, in syphilis, in rheumatism." As to scrofula, syphilis, and rheumatism, we are not aware that they frequently skip one generation in their descent; but we do not hesitate to assert that, as regards alcoholism, the opinion of the author is very much exaggerated, if not totally erroneous, as will appear hereafter.

The same author distinguishes three varieties of "homotypic" heredity (in similars): 1. A variety which admits no discussion, namely the transmission of a defect or a vice from parents to offspring. 2. A variety which consists in the transmission of the symptoms of chronic alcoholism to a de-

scendant who has never been guilty either of excess or frequency. 3. Impulsive insanity as a manifestation of alcoholism. Unusual precocities, perversion of the moral sense, instinctive monomania are among its symptoms.

This classification is open to criticism. Crothers says: "Habitual drunkenness, inebriety, is either a vice or a disease; it cannot be both." If this view be correct, the first variety of our author is amenable to discussion. As to the second variety, as we understand it, it is the "hereditary alcoholism" of Lancereaux and is open to the objections which we have specified above. The accidents suggested under this heading should be grouped with all the other heritable defects, such as idiocy, epilepsy, mental weaknes, etc., transmitted by alcoholics to their offspring—heritance in dissimilars. Furthermore, this variety covers only the posterity, not the ancestry of hereditary alcoholismics, and does not come within our scope.

Finally, the third variety may be distinctly recognized. It distinguishes in effect a class of cases in which the hereditary taint is not subject to doubt, for instance, the precocity, often astonishing, of the fondness for strong drinks, noticeable in certain offspring of alcoholismics.

As to latent heredity of alcoholism, Crothers ("Medical Record," 1881, p. 402) expresses an opinion similar to that of Thompson and of Taguet, both of whom we have already quoted. "In many cases," Crothers says, "alcoholism has a preliminary period, varying in duration, before the addiction to strong drink develops itself, and in some cases, before the initiation by the first alcoholic indulgence. Alcoholism then makes itself known under shelter of the reparatory measures against the wear and waste of years, or after a nervous shock, or some sickness, entirely outside of all temptation and simply from the habitual use of stimulants. The patient commences to drink for relief to his sufferings; then he increases his potation; and finally he can no longer do without them. Such a subject has started with latent alcoholism."

Is not this latent alcoholism, which develops under the influence of a habit growing into an irresistible necessity, the pathological condition which the English designate as "chronic dipsomania" and which Ball distinguishes under the term "acquired dipsomania?"

We attach little importance to this difference of names. We shall hereafter return to this subject, with insistence that a special characteristic of alcoholism is its inherited predisposition.

What we wish especially to demonstrate from these numerous opinions is the fact of the real existence of heredity in similars for alcoholism. We pass over the explanations heretofore given of its mode of action, and of the influences invoked for its development. It is our task to study now in what conditions heredity manifests itself in alcoholism, and what position it occupies in its genesis.

As a preliminary step to this study, it is important to establish the proportion of alcoholismics by heredity, to the number of those who are not, or, more properly expressed, who do not appear to be such.

Let us divide the alcoholismics by heredity into two categories, corresponding to the forms of heredity in similars and in dissimilars. We have found in earlier authors no exact indications upon this subject, either as to heredity in general, or as to the subdivisions of the class. Grenier (l. c.) is the only one, to our knowledge, who devotes a few words to them in his conclusions: "The progeny of alcoholismics become themselves alcoholismics in a notable proportion; approximately in one-half of the number." Lancereaux also says that nothing is more common than to see the sons of drunkards indulging, from the earliest age, in excesses in strong drink. But, up to the present time, we believe, no statistics on this subject have been clearly established, and writers have confined themselves to approximations, which probably are very near the truth, since the majority of authors seem to agree in their estimates. But these representations would undoubtedly gain in accuracy by being confronted with reliable statistics.

This omission we have endeavored to rectify, and we here offer the results of our personal observations and unedited memoranda.

We have traced the origin of alcoholism in 350 families, one or more members of which were tainted. Of these 350 families, there were 209 in which we could find no acknowledged hereditary ancestor whose condition would account for the alcoholism. We have, therefore, admitted the existence

of the disease without inheritance in 209 cases, say in 59.71 per cent of the whole number.

In 141 cases the alcoholism was linked with conditions of heredity, viz., in 106 cases by heredity in similars and in 35 cases by heredity in dissimilars. These, in the aggregate, make 40.29 per cent of the whole number.

If we analyze the cases of heredity in similars we find,

Transmission to two generations,	.	93 cases.
" " three "	.	10 "
" " four "	.	3 "

In certain cases we have observed that alcoholism, after having been transmitted directly to two generations in one branch of the family, has been transmitted indirectly in skipping from the first to the third generation, tainting a member of another branch of the same family.

In one case the alcoholism, after being transmitted directly to the first two generations, was transmitted collaterally to the third and fourth generations, among which it was again transmitted directly.

These skips in the march of heredity of alcoholism are very rare; in the great majority of cases the alcoholism is transmitted directly from one generation to the succeeding one.

To resume our figures. Alcoholism appears to be hereditary in only 40.29 per cent, and not so in 59.71 per cent of the cases.

These numbers might be received without comment, but we cannot accept them without question; there is probably an error of computation; and the proportion of hereditary cases is, almost beyond doubt, below the truth, for the following reasons: The patients, in whose families we have sought out and found alcoholism, and endeavored to trace the exciting causes of the disease, were all degenerates of a low order; idiotical, incompletely developed, feeble, epileptic. Although it may be admitted that alcoholism is a powerful cause of degeneration, it cannot be claimed to act with such extreme rapidity, except under very special circumstances, as to annihilate the race in a single transmission from one generation to the next. It is quite certain that in a number of our subjects, where we could trace no tainted ancestor, the acknowledged

procreators were exceedingly few in number and insufficiently described, whether wilfully or from ignorance. We cannot admit that, in certain cases, so insufficient a hereditary taint as a slight degree of alcoholism in the father could bring about in the first succeeding generation so profound a degeneration as idiocy; while, on the contrary, we almost constantly observe that the degree of degeneration is proportioned to the intensity or the extent of the hereditary taint transmitted. We cannot admit as a factor a greater or less susceptibility to deterioration, because this susceptibility would itself constitute a part of the inheritance.

When, therefore, we see a very profound degeneration attributed to a slight hereditary taint, we feel justified in assuming, and reason even obliges us to do so, that our logical data are insufficient, that something has escaped us. Of course this remark is intended to apply to the majority of cases. We willingly admit, and we could easily cite examples to prove, that, under some particular circumstances, alcoholism may assume a character so grave, viewed from the standpoint of heredity, as to lead almost inevitably to the downfall of the race. Such causes are, particularly, conception during drunkenness, cerebral lesions, and all such complications as may convert alcoholism into confirmed cerebritis; in such cases the intensity of the process developed outstrips the slow and progressive action of heredity. But these cases do not enter into our schedule.

We claim that our statistics show only the minimum percentage of alcoholism by heredity; we feel justified in believing that the true percentage is much greater than that tabulated. Our table forms good ground for the assertion, that in nearly half the cases of alcoholism it is inherited, and that not only is it subject to the general law of heredity, but also to the special law of heredity in similars, which manifests itself in 75.7 per cent of cases, as against 24.3 per cent in which heredity in dissimilars appears.

We now advance one step farther, and inquire, In how many consecutive generations can heredity in similars in alcoholism be discerned?

According to Darwin ("Zoonomia"), alcoholism is transmissible through three generations, and the families of drunkards die out at the fourth generation, after having gradually

sunk in the scale of degeneration, both physical and intellectual.

Such is also the opinion of Morel, who describes the usual course of the successive transformations which occur in the families of drunkards, while discussing a case which presents these degradations ("Degenerations," p. 114).

1st generation. Alcoholic excesses, depravity, moral turpitude, brutal instincts.
2d generation. Habitual drunkenness, attacks of mania, general paralysis.
3d generation. Hypochondriacal tendencies, lypemania, thoughts of suicide, thoughts of homicide.
4th generation. Undeveloped intelligence, stupidity, idiocy, and finally, probable extinction of the race.

From this table it would appear that Morel admits heredity in similars for only two generations. But if, according to him, this be the general rule, he, nevertheless, alongside of the case which illustrates his rule, cites several others where the proneness to strong drinks manifested itself during three generations.

We believe that the extinction of the race may be delayed to the fifth instead of to the fourth generation. We trust that our statistics will justify the following deductions. In the majority of cases the transmission of alcoholism occurs directly to two successive generations. Out of 106 cases of alcoholism by heredity 93 were cases of transmission to two generations. Transmission to three generations occurs less frequently; in 10 cases. Transmission to four generations occurs only three times. But in these cases it exists in a positive and recognizable form; and this suffices to prove that the progeny of alcoholics does not always die out at the fourth generation.

There may possibly be transmission to five generations, which we have not been able to trace, owing to the difficulty of obtaining exact information regarding so many generations. Probably only in historical families could we find memoranda of such remote genealogies; and these are apt to be inaccurate from several causes. Although such transmission may occur, we have not met with a single case in observation or on record.

We shall here state only such facts in the transmission of alcoholism to two generations as have appeared to us most striking, that is, those cases in which alcoholism cannot be attributed to any other cause than heredity.

All the cases marked ("unedited") are taken from the hospital wards under care of Dr. Bourneville, at Bicêtre.

CASE I. (unedited).—Han——, Bernard, age 18 years. Epilepsy, mental debility. Father, printer, died in a state of drunkenness. Addicted to excesses in strong drinks, particularly brandy and absinthe, whenever he could get money, and continuously for several successive days. Paternal uncle, lithographer, notable excesses in drink. Paternal grandfather, carter, considerable excesses in drink. Three brothers died of athrepsia. One brother died of convulsions. One brother died soon after birth. Nothing notable on the side of mother.

CASE II. (unedited).—Fourn——, age 10 years, complete idiocy; hemiplegia of left side; epilepsy. Father, stone cutter. Alcoholic habits; comes home completely drunk a dozen times a year; drinks principally wine. Paternal grandfather, stone cutter, died of phthisis pulmonalis. Frequent excesses in strong drink. One sister died of convulsions. Nothing notable on the side of mother.

CASE III. (unedited).—Goff——, age 9 years. Epilepsy and imbecility. Father, age 32 years, dairyman. Nervous, violent, committed several times for wife-beating. Subject to violent headaches, especially after excesses in drink. He is always half tipsy, and in this condition is very excitable and mischievous. Drinks wine, absinthe, brandy, indiscriminately. Has always been dangerous, and addicted to drink. Paternal grandfather, a beggar in Cantal. Never liked work; is inclined to mischief and drinks. His wife says of him that "he is of the same calibre as his son; they require their women folks to feed them." He has had three wives. Paternal uncle, a hard case. He did nothing but drink and led a disorderly married life in Paris. Had to be sent back to his native district. Four brothers died of convulsions. One sister living, very nervous. One brother living, has had convulsions.

CASE IV. (unedited).—Leclu ——, Emile, age 33 years; epilepsy. Father, age 60 years, coachman. Excessive drinking, especially of absinthe. Came home drunk more than four times

a week. Drank up all his earnings and never could keep a situation. Violent, especially when in his cups. No headaches. No epilepsy. Had several attacks of giddiness, when about 42 years of age; these were attributed to the use of absinthe. It is not known what has become of him since that period, at which time he deserted his wife and children. Paternal grandfather, drowned. Tavern-keeper, and before that butcher. Was a heavy drinker. Mother, age 52 years, laundry woman. Nervous. Maternal grandfather, convulsions till 15 years of age. Died of pneumonia. No excesses of drink, although he was a coachman.

In these four cases, alcoholism appears to have had heredity for its sole cause. In the last one particularly, this influence is distinctly marked. We may also note how cautiously the influence of trades or occupation should be admitted; on both sides of this last family, we have the same trade of coachman, which is regarded as especially conducive to alcoholism. On the one side we observe alcoholism and his father was alcoholic. On the other, where there is no such heredity, there is also no alcoholism.

The following case appears to us equally conclusive: that of a young woman in whom we can trace no causative influence, other than alcoholic heredity. It is generally known, as we will show farther on, that alcoholism is less frequent in women than in men, and requires more powerful causes to develop it in the former than in the latter.

CASE V. (Thesis Gendron).—Nouri——, Elise, age 38 years, model. Father, alcoholic, committed suicide. Patient does well till 15 years of age. Then painful menstruation, with suffocations, syncopes, cries, fits. At 19 years of age she goes to Brazil, and commences to drink gin in large quantities. On her return to France has formications, dreams, insomnia, attempts at suicide.

Let us remark that in this case the alcoholism develops in the same form. The next one is a case where alcoholism develops at the same time in three children of an alcoholic mother.

CASE VI. (Thesis Gendron).—Father not addicted to alco-

hol. Mother died at 62 years of age, paralyzed; she had borne three children, two girls and one boy. The last in good health, but addicted to strong drink, which tendency he can, however, most generally resist. The first daughter was epileptic, microcephalic, and a drunkard; she died aged 27 years, from burns received by falling into the fire. The second daughter rachitic, with a double luxation of the hips; also became a drunkard; died of tuberculosis.

Heredity in similars between two generations may concur from the side of both father and mother, and this hereditary convergence is one of the aggravating circumstances which tend to the rapid extinction of the race. The following cases seem to us interesting from this point of view.

CASE VII. (unedited).—Hub——, Jules, age 19 years, epilepsy. Father, copper-plate engraver; died of phthisis; weak in character, lacking in will power, and easily led astray. He came home drunk two or three times every week. He drank brandy, rum, wine-dregs, absinthe. After drinking deeply (as his wife says), he fell into fits if contradicted or annoyed. If he were seated at the time he fell down suddenly, lost consciousness, had convulsive movements of arms and legs. He whined during the whole attack. No foamings. No appreciable change in the color of the face. Nothing similar to these attacks in childhood. Grandfather on the father's side, 74 years old, out-door salesman for a druggists' firm, is at Bicêtre as an employee. Before coming there, had attacks of giddiness, "as if he were going to faint." Very frequent excesss in drinking. Grandmother on the father's side died of phthisis. One grand-uncle on father's side, ship carpenter, died at 37 years of age, from excesses in drink. One uncle on father's side died of lung disease and excesses in drink, at the age of 25 years. Mother subject to headaches. Grandmother on mother's side, epileptic; often drinks to excess. Great-grandfather on the mother's side asthmatic, excessive drinker. One brother died of convulsions at the age of six weeks. One brother imbecile, paraplegia. One sister nervous, delicate, frail.

CASE VIII. (unedited).—Lob——, age 18 months. Hydrocephalus. Father, age 26, journeyman, exempted from military

duty on account of weak constitution, though of regulation height. From 22 to 24 years of age committed frequent excesses in strong drinks. Began these indulgences at 18 years. After drinking he became exceedingly violent, rolled himself on the ground, into a ball, crying out, and gnashing his teeth. These fits lasted about fifteen minutes at a time, as witnessed by his wife. He indulges less and less in excessive drinking. Cephalalgia after the excesses; becomes violent, beats his wife. Paternal grandfather, aged 51 years, stone-cutter. Has led a bad life. Addicted to frequent excesses in strong drink; often beats his wife. After receiving an inheritance of six or seven thousand francs, he abandoned his family, and eloped with his wife's sister-in-law. Paternal grandmother, age 52, washerwoman. Alcoholic facies. Has always drunk, and is always tipsy with wine. In robust health. Eczema of the head at 50 years of age. Three paternal uncles all sober. One paternal aunt died of convulsions in childhood.

Mother subject to headaches. Maternal grandfather, age 59 years, drank excessively till 50 years of age. Was already a hard drinker at the time he married. Maternal grandmother subject to headaches. Paternal great-grandparents, and maternal great-grandmother, nothing notable. Maternal great-grandfather, wine merchant, addicted to very frequent excesses in strong drink. Maternal grand-uncle (son of the last-named), addicted to strong drink; died from effects of a fall. Another maternal grand-uncle died of convulsions.

We might call attention to many similar cases; they will be found, however, collected in our statistical schedule. In a large proportion of the cases there reported, other hereditary taints besides alcoholism may be recognized. In the cases just presented, we have chosen examples where alcoholism is found unmixed with other inherited complications.

Cases in which alcoholism, uncomplicated, manifests itself in three successive generations are comparatively rare. We have, however, a clear example of it in the following case. We have carefully noted all the details we were able to gather. It is not sufficient to say of a person that he is alcoholic or alcoholismic; it is further useful to know to what extent he is thus affected, and what kind of an individual he is, in a general way. Alcoholics and alcoholismics have an ex-

istence and manner of acting which are closely related to their morbid conditions, and place them thus in special categories as to their mental status; these traits are always interesting to examine in their mutual relations. In order to guard against misinterpreting and exaggerating the information given, we have frequently adhered to the quaint words of our informants: the picturesque style of their phraseology often conveys the facts better than we could express them.

CASE IX.—Clouz——, age 3 years. Complete idiocy. Mother, age 22 years, left her husband four months after the birth of her child. "She had an uncontrollable temper; was a bad mother." Married at 17 years of age; in good health; not nervous. No convulsions in childhood; no headaches. She drank hard for some time even before her marriage. "It ran in the family," her husband says. She drank wine, rum, not to the extent of being unable to stand up, but so as to be always over-excited. She continued to drink after her marriage and went to her mother's to indulge this appetite. The habit was not periodical but continuous; more or less violent, whimsical; extremely self-willed and stubborn, even in trifles and from pure deviltry. Possibly she had gone to the bad before her marriage. Maternal grandfather died at age of 40 of albuminuria. Health officer; habitual high liver; drank hard and went on a "spree" several times a month. Paternal grandmother, age 43 years, very nervous; always tipsy; drinks enormously, especially spirits, brandy, rum, etc. She drank freely during her husband's lifetime, but has drunk much more deeply since his death. She is attainted with hereditary syphilis. Paternal great-grandfather, syphilis acquired after the birth of his son; imparted it to his wife. High liver. Maternal great-grandmother, nothing notable. Maternal great-grandfather (father of the grandmother), syphilis before the birth of his daughter. Maternal great-grandmother, heavy drinker; indulged most freely in secret; she bore the effects of habitual drink better than any other member of the family; very whimsical in disposition.

CASE X. (Thesis Gendron).—Victorine X——. Father, drunkard. Paternal grandparents, drunkards. On mother's side, nothing remarkable. Brother, weak-minded; very prone to strong drink. The girl herself intelligent and fond of her

family. Suddenly, without known cause, had an attack of mania which lasted fifteen days, and left her in a state of dementia.

CASE XI. (unedited).—Sauln——, Louis, age 10 years, imbecile. Father, 36 years, roofer. Enormous drinker of absinthe, brandy, wine; gets drunk about five days in the week; has been a drinker since the age of 11 years. When in drink he is very dangerous, "as if crazy"; breaks everything; quarrels with everybody. Epileptic attacks since two or three years. Paternal grandfather, age 63, roofer. Drinks, but not so enormously as his son. Paternal grandmother, age 53 years, washerwoman. Has always been a drinker; no longer gets drunk except by chance; but formerly was a habitual toper, on absinthe. When in drink, she, like her son, is very dangerous. Great grandmother (mother of the grandmother), washerwoman. Died at 74 years of age "by dint of drinking." Every day she got drunk on absinthe. Great grandfather (father of the grandmother), coachman; hard drinker. Paternal uncle, drunkard; suicide by hanging. Six paternal grand-uncles died in early childhood (age about 2 or 3 years), of meningitis or of croup.

CASE XII. (Doursout, "Annal. Médic. Psych.," 1886).—Man, age 25 years, lazy and drunken; beggar, thief, weak-minded. Committed attempt at outrage. Brother, habitual drunkard and lazy. Sister, unsteady and unmanageable. Father, drunkard; died prematurely. Mother, died of phthisis, of alcoholic origin. Grandmother attacked with alcoholic dementia and died in the Asylum at Morlaix.

We will now submit a few cases in which alcoholism has manifested itself in four consecutive generations. From among the cases of this prolonged transmission, which have come very rarely within our observation, we select the following, which appear to us as complete as possible, and free from foreign complications.

CASE XIII. (unedited).—Pic——, George, age 15 years, epilepsy; amaurosis, following meningitis at age 3 years; convulsions at age 6 months. Father, age 56 years, mason. His trade, he says, obliges him sometimes to drink to excess. He takes a drink of brandy in the morning, and about two

quarts of wine in the day. Trembling of hands; alcoholic facies. Paternal grandfather, age 86 years, mason; drank enormously; his son says that "he would drink a quart of alcohol at a sitting," and that "sometimes he got drunk three or four times in twenty-four hours." Paternal uncle, bricklayer; died from excessive drink. Maternal grand-uncle, suicide by hanging; habitual drunkard. Mother—sempstress. Free drinker from time of her marriage. During the siege of Paris, being pregnant at the time with George, and reduced to short commons, she supplied the want of solid food by using strong drinks, taking brandy, absinthe, but little wine. After child-birth, indulgence became more confirmed; she fell sick; she continued her drinking habits; died of tubercular consumption. Maternal grandfather, vine dresser; committed suicide by hanging. He had been placed in confinement by his children on account of habitual drunkenness, and to prevent him from squandering his property. He had always been a hard drinker, taking brandy by the tumblerful. Maternal grandmother, died paralyzed at the Salpétrière hospital. Paternal great-grandmother, heavy drinker; died from effects of a fall. Maternal uncle, metal beater; heavy drinker of brandy especially, like his father. Brother, metal beater, age 32 years; intelligent during youth; he commenced drinking at 20 years of age. Frequently drunk; became insane at 23 years of age; attempted suicide; confined at Vaucluse, afterward at Niort. He is insane at the present time. Sister, tuberculous; has three children of whom one has Pott's disease of cervical vertebræ.

The following case is still more distinct, and is less complex, the alcoholism existing only on the father's side.

CASE XIV. (unedited).—Mig——, age 13 years, epilepsy, hemiplegia of right side; convulsions since childhood. Father, age 48, day-laborer. Frequent excesses in strong drink, particularly wine. Married at 38 years of age. At this time he drank absinthe, of which he had contracted the habit while in military service; he continued to drink absinthe and brandy. He now gets drunk every Sunday only. "I have known the time when he was sober not oftener than two or three days in the week," says his wife. Paternal grandfather, metal

beater; died from rupture of an aneurism; frequent excesses in drink. Paternal grandmother, died at St. Amand les Caux, "all but crazy" from frequent ill-treatment by her husband. Paternal great-grandmother, frequent excesses in strong drink. One paternal uncle died of rabies. Another paternal uncle, frequent alcoholic excesses; had one child, who died in infancy. Paternal aunt, housekeeper; frequent excesses of strong drinks; married; has two daughters who are cousins-german of Mige——. The elder cousin, age 24, is married; free drinker; had been drunk before she was married. The younger cousin is given to sprees and to men; has had one child who died young.

These two cousins-german belong to the fourth generation from the paternal great-grandmother. There is no other cause of alcoholism apparent in each generation than the alcoholismic heredity.

In order to mark more distinctly the influence exercised by this inherited alcoholism, we have reported also the affections which have attacked those members of the family in whom alcoholism has not appeared. We have followed this practice in all our observations. This course is the only one that enables us to discriminate the influence of heredity in dissimilars in alcoholism, and the relations which connect it with the various manifestations of neuropathic heredity in general.

In all the preceding cases the heredity has been direct or continuous; but it may remain latent in one generation to reappear in that following.

Case XV. (unedited).—Margal——, Peter, age 13 years, epilepsy. Father, age 43 years, mason; convulsions in childhood; always a hard drinker, even before his marriage, at the age of 21. Drinks chiefly brandy; little or no absinthe; gets drunk almost every day. Trembling of the hands. He is mischievous when drunk; beats his wife; and behaves "as if crazy." For the past three years he is hebetudinous; does not attempt to work. There is no connection in his words or his ideas. Every winter he has coughs; at one time he was thought to have lung disease; has frequent headaches; in disposition he is rough and violent. Paternal grandfather,

carter; was hanged at the age of 48 years, for cause unknown. He never drank, but was of cranky disposition. Grandmother (wife of preceding), violent headaches, at least once a week. Paternal great grandfather, carter; mischievous; habitual drunkard; asthmatic; cause of death unknown. Paternal grand-uncle (brother of the grandmother and cousin-german of the grandfather), carter; drunkard; fractious. Two paternal uncles, drunkards; fractious; one of them somewhat crazy. Maternal grandfather, vine dresser; drunkard; has always drunk; attack of alcoholic delirium about two years ago. Female cousin-german on mother's side, died of meningitis. Mother has no alcoholic habits. Brother, age 21 years; hairdresser; no convulsions during childhood; good workman. He already drinks too much; often "seedy"; irregular home habits since 18 years of age. Commenced suddenly to drink hard; was not led into it by his father. Peter (our subject), age 13, epileptic; imbecile. The mother fears that another brother, aged 17 years, will follow the example of his elder brother, aged 21 years. Other two brothers are in good health, and are intelligent.

The alcoholismic heredity in this case has been transmitted through four generations. From the great-grandfather it skipped over the grandfather to attaint the father, and from this last descended to his son. At the same time we observe an advanced degeneration in the race, as evidenced by manifestation of epilepsy and imbecility. Here then we see direct heredity and diadromic heredity in the same family.

Collateral heredity may also occur; we will see instances of it in our statistical table. We will exemplify by quoting two cases.

CASE XVI.—Dethm——, age 11 years, idiocy. Grand-uncle and father, alcoholists; the latter alcoholismic.

CASE XVII.—Min——, age 7 years, idiocy. Paternal grand-uncle and father, alcoholists; the latter alcoholismic.

In these two cases there existed no other alcoholists in either family.

This collateral heredity is quite rare, and less frequent even than diadromic heredity. Our denial of the opinion we

have quoted above from one of the essayists before the Belgian Academy as to "the remarkable immunity of the direct descendants, and the manifestation of alcoholismic symptoms in the second generation" is based upon our personal observations. Out of the 106 cases of heredity in similars, we find only 8 in which the proneness to strong drink skips one generation. This fact is more convincing than anything we might say.

We offer, then, the following conclusions concerning the general influence of heredity in alcoholism:

1. In at least 49.29 per cent of the cases alcoholism is primarily due to heredity.

2. In the majority of these cases of heredity, say 75.7 per cent, the heredity is in similars; and in the remaining cases, say 24.3 per cent, the heredity is in dissimilars.

3. It is generally direct heredity that occurs in heredity in similars.

4. Heredity in similars may manifest itself in four consecutive generations, but this occurs rarely, and it is probable that this heredity never extends beyond this limit.

CHAPTER II.

STATISTICS.

BEFORE entering upon the discussion of the various questions which devolve from the principle of heredity in alcoholism, we will submit the statistics upon which we base our conclusions.

We will commence with those families in which we have been unable to trace any hereditary cause. These cases we divide into two groups:

1. Those cases of alcoholismics ("alcoholiques") whose ancestors were not alcoholists.

2. Those cases of alcoholismics ("alcoholiques") whose progeny were not alcoholists.

In both these classes alcoholism has shown itself only in a transitory way, as it were, sporadically.

NON-HEREDITARY ALCOHOLISM.

A. Alcoholismics, whose ancestors were not alcoholists. (This ancestry is considered from the generation next above the parent or relative reported as "alcoholic.")

Complete idiocy: father alcoholic, 8; two maternal uncles alcoholic, 1; paternal grandfather alcoholic, 1; paternal uncle alcoholic, 1. Symptomatic idiocy: father alcoholic, 4. Symptomatic idiocy and epilepsy: father alcoholic, 6. Imbecility: father alcoholic, 2; mother alcoholic, 3. Imbecility and goitre: father alcoholic, 1. Imbecility and instability: father alcoholic, 1. Imbecility and hemiplegia: father alcoholic, 2. Imbecility and perversion of instincts: father alcoholic, 1. Imbecility and alcoholism: antecedents unknown, 1. Idiopathic epilepsy: father alcoholic, 3; mother alcoholic, 2; mother alcoholic, 1; paternal uncle alcoholic, 1. Epilepsy and right hemiplegia: father alcoholic, 1. Epilepsy and alcoholism: antecedents unknown, or sister alcoholic, 1. Epilepsy

and weak-mindedness: father alcoholic, 4. Epilepsy and dementia: brother alcoholic, 1. Mental instability: father alcoholic, 1. Instability and perversion of instincts: father alcoholic, 1. Pachydermic cachexia: father alcoholic, 1. Total, 55 cases. (The ages of the patients ranged from 3 to 47 years.)

B. Alcoholismics whose progeny are not alcoholists. (The progeny considered is that derived from the ancestor reported as "alcoholic.")

Idiocy: maternal grandfather alcoholic, 5; maternal great-grandfather alcoholic, 3; maternal grandparents alcoholic, 1; paternal grandfather alcoholic, 3; paternal grandmother alcoholic, 1; father alcoholic, 1. Symptomatic idiocy: paternal grandfather alcoholic, 1. Complete idiocy: maternal grandfather alcoholic, 12; maternal grandmother alcoholic, 2; maternal grandparents alcoholic, 1; maternal great-grandfather alcoholic, 1; paternal grandfather alcoholic, 7; father alcoholic, 1. Complete idiocy and microcephalus: father alcoholic, 1. Idiocy and hydrocephalus: paternal grandfather alcoholic, 1. Idiocy and convulsions: father alcoholic, 1. Idiocy and epilepsy: paternal grandfather alcoholic 3; maternal grandfather alcoholic, 6. Idiocy, epilepsy, and blindness: father alcoholic, 1. Imbecility: maternal grandfather alcoholic, 5; paternal grandfather alcoholic, 6; father alcoholic, 1. Congenital imbecility: paternal grandmother alcoholic, 1. Imbecility and strabismus: maternal grandfather alcoholic, 1. Imbecility and goitre: maternal grand-aunt alcoholic, 1. Imbecility and perversion of instincts: paternal grandfather alcoholic, 1. Imbecility and mental instability: paternal grandfather alcoholic, 1; maternal grandfather and grand-uncle alcoholic, 1. Imbecility and hemiplegia: maternal grandfather alcoholic, 2. Imbecility and cerebral atrophy: paternal grandfather alcoholic, 1; maternal grandmother alcoholic, 1. Imbecility and infantile insanity: paternal grandfather alcoholic, 1. Imbecility and epilepsy: maternal grandfather alcoholic, 3; paternal grandfather alcoholic, 2; paternal uncle alcoholic, 1; father alcoholic, 2; father and three uncles alcoholic, 1. Imbecility, epilepsy, and vertigo: maternal grandfather alcoholic, 1. Imbecility, epilepsy, and strabismus: father alcoholic, 1. Epilepsy: maternal grandfather alcoholic, 11; maternal grandfather and grand-uncle alcoholic, 1; paternal grandfather alcoholic, 4; father alco-

holic, 5; antecedents unknown, 1. Partial epilepsy: maternal grandfather alcoholic, 1. Tardily developed epilepsy: father alcoholic, 1. Hereditary epilepsy: maternal grandfather alcoholic, 1. Procursive epilepsy: maternal grandfather alcoholic, 1; paternal grandfather alcoholic, 1. Idiopathic epilepsy: maternal grandfather alcoholic, 5; maternal grandfather and grand-uncle alcoholic, 1; paternal grandmother alcoholic, 1; paternal grandfather alcoholic, 2; father alcoholic, 2; father and three uncles alcoholic, 1. Symptomatic epilepsy: maternal grandfather alcoholic, 2; maternal great-grandfather alcoholic, 1; paternal great-grandfather alcoholic, 1; father alcoholic, 1. Symptomatic epilepsy and idiocy: maternal grandfather alcoholic, 1; father alcoholic, 1. Epilepsy and alcoholism: antecedents unknown, 1. Epilepsy and mental debility: maternal grandfather alcoholic, 3; paternal grandfather alcoholic, 1; father alcoholic, 1. Epilepsy and mental instability: paternal grandfather alcoholic, 1. Epilepsy and hemiplegia: maternal grandfather alcoholic, 2; paternal grandfather alcoholic, 1. Epilepsy, hemiplegia, and imbecility: maternal grandfather alcoholic, 1. Hystero-epilepsy: maternal grandfather alcoholic, 1. Mental instability: maternal grandfather alcoholic, 2; paternal grandfather alcoholic, 1. Mental debility: paternal grandfather alcoholic, 1; maternal grandfather alcoholic, 1. Mental debility and chorea: father alcoholic, 1. Infantile cerebral hemiplegia: maternal grandfather alcoholic, 1. Arrested development and perversion of instincts: father alcoholic, 1. Cerebral atrophy, athetosis, and debility: maternal grandfather alcoholic, 1. Microcephalus: maternal grandfather alcoholic, 1. Total, 154 cases. (The ages ranged from 15 months to 47 years.)

In considering these statistics we are led to suggest extreme caution to the student in estimating the value of observations regarding transmission from one generation to the following one, where the father alone is alcoholic. It is doubtful whether, further on, diadromic heredity may or may not attack the second generation, or whether the progeny of the first generation may not subsequently become alcoholic. Fear of such contingency seems reasonable when we see among the offspring cases with such advanced degenerations as imbecility and epilepsy. We must bear in mind, also, that in a number of cases information concerning the procreators is

entirely wanting. And we have noted in some instances that the alcoholic subject's father was unknown. Perhaps this father may have been likewise alcoholic. His conduct toward his child suggests that his morals were not irreproachable, and none too good for habitual drunkenness.

We have carefully discriminated all those doubtful cases, and have classified them as non-hereditary, lest we be charged with too much complaisance, in admitting heredity as an exciting cause of alcoholism.

We shall now summarize the cases of alcoholism by heredity, of which we have collected notes during our service in the wards. We shall also hereafter give detailed studies of some of them. We divide them into two classes: inheritors of similars, and inheritors of dissimilars.

1. Heredity in Similars.

Idiocy: father and paternal grand-uncle alcoholic, 2; father and paternal grandfather alcoholic, 2; father and paternal grandfather alcoholic, paternal uncle suicide, 1; father, paternal grandfather, grandmother, and cousins-german alcoholic, paternal great-grandfather hung, 1. Slight idiocy: father and paternal grandfather alcoholic, 2. Congenital idiocy: paternal grandfather and great-grandfather alcoholic, 1; brother, father, paternal grandfather, and maternal grandmother alcoholic, 1; father and paternal grandfather alcoholic and apoplectic, paternal uncle suicide, paternal grand-uncle apoplectic, paternal great-grandmother senile dementia, 1. Complete idiocy: father and paternal grandfather alcoholic, 3; father and paternal grandfather alcoholic, paternal grandmother hemiplegic, 1; maternal uncle and grandfather alcoholic, 1; mother, maternal grandfather and grandmother alcoholic, 1. Idiocy and deafness: father and paternal grandfather alcoholic, 1; father, paternal grandfather and grand-uncle alcoholic, 1. Idiocy and hydrocephalus: father and paternal grandfather alcoholic, 1. Complete idiocy and epilepsy: maternal grandfather alcoholic and insane, maternal great-grandfather and father (nephew of maternal grandfather) alcoholic, 1; maternal grandfather and uncle alcoholic, maternal great-grandfather nervous fits, 1; mother and maternal grandmother alcoholic and debauched, 1; father, paternal uncle and

grandfather alcoholic, paternal grand-aunt insane, 1. Imbecility: father alcoholic, paternal grandmother alcoholic and insane, 1; father, uncle, and paternal grandfather alcoholic, 1; paternal grandfather and great-grandmother alcoholic, 1; mother and maternal grandfather alcoholic, 1; father alcoholic, paternal grandmother alcoholic and insane, paternal grandfather paralysis, paternal aunt and great-grandmother dementia, paternal uncle insane, 1. Pronounced imbecility: father and paternal grandfather alcoholic, paternal grandmother paralysis, 1. Imbecility and hysteria: father and paternal grandfather alcoholic, 1. Imbecility and left hemiplegia: father and paternal grandfather alcoholic, 1. Imbecility and strabismus: father, paternal grandfather and grandmother, great-grandfather and great-grandmother alcoholic, 1. Imbecility and hydrocephalus: father, paternal grandfather and grandmother alcoholic, 1. Imbecility and infantile paralysis: paternal grandfather alcoholic and apoplectic, paternal great-grandfather alcoholic, paternal great-grandmother apoplectic, 1. Imbecility and cerebral sclerosis: maternal uncle and grandfather alcoholic, 1. Imbecility and cerebral atrophy: father alcoholic, paternal grandfather alcoholic and suicide, 1. Imbecility and epilepsy: paternal grandfather alcoholic, two paternal cousins-german alcoholic and imbecile, 1; father, paternal uncle and grandfather alcoholic, 1; father and paternal grandfather alcoholic, 1; mother and maternal grandfather alcoholics, maternal grand-aunt and grandmother suicides, 1. Epilepsy: father and paternal grandfather alcoholic, 5; mother and maternal grandmother alcoholic, 1; father, paternal uncle, and grandfather alcoholic, 1; brother, father, paternal uncle and grandfather alcoholic, paternal grand-uncle alcoholic and suicide, mother alcoholic, maternal grandfather alcoholic and died by hanging, maternal grandmother alcoholic and paralysis, maternal uncle and great-grandmother alcoholic, 1; maternal grandmother and great-grandmother alcoholic, 1; father, two paternal uncles and grandfather alcoholic, sister nervous, maternal grand-aunt insane, maternal grandfather paralysis, 1; brother, father, paternal grand-uncle, and grandfather alcoholic, 1; brother, father, and paternal grandfather alcoholic, 1. Idiopathic epilepsy: maternal grandmother and cousin-german alcoholic and insane, 1; father and paternal grand-uncle alcoholic, 1;

father and paternal grandfather alcoholic, 6; father, paternal grandfather, and two aunts alcoholic, 1; paternal grand-uncle and great grandfather alcoholic and suicides, 1; father and paternal grandfather alcoholic, paternal cousin-german insane, 1. Symptomatic epilepsy: paternal uncle and grandfather alcoholic, paternal grandmother died of spinal-cord disease, 1. Epilepsy and hysteria: two maternal uncles and grandfather alcoholic, 1. Epilepsy and alcoholism: father and paternal grandfather alcoholic, 2; father alcoholic and apoplectic, brother apoplectic, cousin feeble, 1; father and brother alcoholic, 1; father alcoholic, 2; father alcoholic, debauched, paralyzed, paternal grandfather paralyzed, 1; mother alcoholic, 1; father and maternal grandfather alcoholic, 1; paternal grandfather alcoholic, paternal uncle insane, paternal cousin-german hysteria, 1. Epilepsy and hemiplegia: father and paternal grandfather alcoholic, 1; father and paternal grandfather alcoholic, paternal grandmother paralyzed, 1; father and paternal grandmother alcoholic, 1; maternal uncle and grandfather alcoholic, 1; father, paternal uncle, aunt, cousin-german, grandfather, and great-grandfather alcoholic, paternal grandmother insane, 1. Epilepsy, athetosis, and hemiplegia: father, paternal grandfather, and cousin-german alcoholic, 1. Epilepsy and mental instability: father and paternal grandfather alcoholic, 1. Epilepsy and mental debility: father and paternal grandfather alcoholic, 2; mother and maternal grandfather alcoholic, 1; father, paternal uncle and grandfather alcoholic, 1. Epilepsy and dementia: father ataxic, paternal uncle alcoholic, paternal grandfather delirum tremens, paternal great-grandfather alcoholic, 1. Epilepsy, idiocy, and hemiplegia: father and paternal grandfather alcoholic, 1. Hystero-epilepsy: father absinthe inebriate and homicidal, paternal grandfather alcoholic, 1; father and paternal grandfather alcoholic, 1; father alcoholic, paternal grandfather alcoholic, drowned, 1; maternal grandfather and great-grandfather alcoholic, 1. Alcoholism: maternal grandfather alcoholic, maternal great-grandmother paralyzed, maternal cousin insane, 1; Mental debility: father and paternal grandfather alcoholic, 1. Mental instability: father and maternal grandfather alcoholic, 1; father and sister alcoholic, mother insane, 1; father alcoholic and suicide, paternal uncle and grandmother alcoholic, 1. Hydrocephalus: father, paternal grand-

father and grandmother alcoholic, 1; maternal great-grandfather and grandfather alcoholic, 1. Cerebral sclerosis: father and paternal grandfather alcoholic, 1. Cerebral atrophy and epilepsy: father and paternal grandfather alcoholic, 1. Cerebral atrophy and hemiplegia: father and paternal grandfather alcoholic and venereal, 1; father, paternal uncle and grandfather alcoholic, paternal aunt hysteric, paternal grand-aunt melancholic, paternal grandmother nervous fits, 1. Infantile insanity and mental debility: father and maternal grandfather alcoholic, 1. Convulsions, vertigo, and imbecility: father and paternal grandfather alcoholic, paternal great-grandfather insane, 1. Total, 106 cases. (The ages ranged from 1 to 59 years.)

2. Heredity in Dissimilars.

Idiocy: maternal uncle alcoholic, maternal grand-uncle dissipated, maternal grandfather alcoholic, 1; maternal grandfather alcoholic, maternal great-grandmother paralyzed, 2; father alcoholic and hysterical, paternal grandfather paralyzed, 1. Symptomatic idiocy: maternal grandmother alcoholic and debauched, maternal great-grand-aunt insane, maternal grand-aunt suicide, 1; mother alcoholic, maternal grandmother insane, 1; father alcoholic, paternal grandfather paralyzed, paternal uncle insane, 1. Complete idiocy: father alcoholic, paternal grandfather cranky and suicide, 1; paternal grand-uncle alcoholic, paternal grandmother nervous excitement, paternal great-grandmother insane, 1. Imbecility: father alcoholic, paternal grandmother senile dementia, 1; father alcoholic, paternal grand-uncle insane, 1; father alcoholic, paternal grandfather dissipated and apoplectic, 1. Symptomatic imbecility: paternal grandfather alcoholic, paternal great-grandfather insane, 1. Pronounced imbecility: father alcoholic, paternal grandfather apoplexy, 1; paternal uncle alcoholic, paternal grandfather asthma and suicide, 1; father and grandfather alcoholic and profligate, paternal grandmother epilepsy and insane, paternal uncle alcoholic, paternal aunt and cousin-german epilepsy, 1. Congenital imbecility: father alcoholic and suicide, paternal uncle alcoholic, paternal great-grandfather suicide, 1. Imbecility, epilepsy, and deafness: father alcoholic, paternal grandmother

dementia, 1. Epilepsy: father alcoholic, paternal grandfather paralysis, 1; father alcoholic, paternal grandfather insane, 1; father alcoholic and epilepsy, paternal grandmother hysteria and debauched, paternal grand-aunt insane, two paternal grand-uncles suicides, 1. Idiopathic epilepsy: father alcoholic and apoplexy, paternal grandfather paralysis, paternal grand-uncle suicide, one paternal uncle epilepsy, another insane, 1; father alcoholic, paternal grandmother paralysis, 1; father alcoholic, paternal aunt insane, paternal grandmother in second childhood, 1. Symptomatic epilepsy: father absinthe drinker, paternal aunt habitual drunkard, paternal grandmother apoplexy, 1. Hereditary epilepsy: father and paternal uncle alcoholic, paternal grandmother epilepsy, 1. Epilepsy and mental debility: father alcoholic, paternal grandfather insane, 1. Epilepsy and imbecility: father alcoholic and general paralysis, paternal grandfather unbalanced, one paternal grand-uncle insane and suicide, another insane, 1. Epilepsy and right hemiplegia: maternal grandfather alcoholic, maternal great-grandfather paralysis, 1. Epilepsy, athetosis, and hemiplegia: father alcoholic, paternal grandfather paralysis, 1. Alcoholism and mental instability: paternal grandfather apoplexy and suicide, mother nervous excitability, maternal grandfather apoplexy, 1. Alcoholism and imbecility: father and paternal uncle alcoholic, paternal grandmother cerebral rheumatism, 1. Alcoholism and epilepsy: father apoplexy, mother nervous excitability and cephalalgia, maternal aunt and grand-aunt insane, 1; mother nervous excitability and epilepsy, 1. Absinthe habit and epilepsy: father died æt. 81, mother senile dementia, 1. Total, 35 cases. (The ages ranged from 3 to 59 years.

CHAPTER III.

INFLUENCE OF HEREDITY ON THE MANIFESTATIONS OF ALCOHOLISM.

THE general influence of heredity being demonstrated, we shall now investigate its manifestation, and the reciprocal reaction of heredity on the one hand, and, on the other, the idiosyncrasy of the subject affected by heredity. In other words, we shall inquire: 1. Does alcoholism by heredity manifest itself in the progeny in the same form as in the procreators? And 2. By influence of what conditions, inherent in, or exterior to, the individual, does alcoholism manifest itself differently in the procreators and the progeny?

In answer to the first problem we shall try to show whether, or not, "alcoholics" by inheritance, *i.e.*, alcoholismics, have a proneness to drink in the same form and manner as their procreators, and to present the same localizations of alcoholism as these ancestors.

CONCEPTION DURING DRUNKENNESS.

Before commencing our investigation I take occasion to state, that in all the cases observed in the hospital wards, as well as in those which figure in the annual reports of treatment rendered, Dr. Bourneville is very careful to specify, or to ascertain as accurately as possible, the condition of the parents at the moment of conception.

The first step in our work will be to eliminate a class of cases which, fortunately, occur very rarely, but to which several authors have called attention, namely: cases of conception during drunkenness. According to the general consensus of writers, and to our personal researches touching this subject, it is demonstrated that the progeny conceived during the drunkenness of either parent is doomed to so pro-

found a degeneration as idiocy, complicated most frequently with epilepsy, hydrocephalus, microcephalus, etc., that it is doomed to a very short span of life, and that, if it should live, it would find itself outside of the influences which might urge it into the same courses as its progenitors. If it does not become alcoholic it is because a substantial impossibility debars any such development.

Alcoholism and Dipsomania.

Can dipsomania engender alcoholism; and reciprocally, Can alcoholism develop dipsomania?

The distinction between dipsomania and alcoholism is far from being laid down with accuracy, or even on the same lines, by various authors. These two pathological conditions, formerly confounded in description, were first discriminated by Bruhl Cramer, followed by Erdman in Russia, Carpenter, Esquirol, Magnus Huss, Forbes Winslow, Morel, Trélat, Marcé, Griesinger, Foville, De la Siauve. These writers have given to dipsomania a separate identity; but they differ as to its causative origin.

According to Bruhl Cramer, Erdman, Magnus Huss, it occurs only in subjects who have long been addicted to strong drink—in habitual drunkards. Instead of constituting a morbid entity by itself, it is only a complication superinduced upon inveterate alcoholism. Esquirol, Marcé, and all the partisans of monomaniacal subdivisions, make it a special disease, a distinct mania. Morel, and with him Forbes Winslow, Griesinger, Trélat, consider it a symptom dependent upon a general disease. Foville describes it as a "neurosis almost always hereditary, and always spontaneous, absolutely independent of the habits of the subject." At the present day, in France, the interpretation advocated by M. Magnan and his school appears to prevail. According to them, "dipsomania is merely an episodic symptom of a more profound mental condition dependent upon heredity." Dipsomania is merely one of the numerous episodial syndromes of the insanity of the degenerate.

In contradiction to the opinion of Lasègue, who considered intermittence a differential sign between alcoholism and dipsomania, M. Magnan admits that dipsomania when its at-

tacks occur at very short intervals may become alcoholism. ("Lessons on Dipsomania," Galangau, Th. Paris.)

Lasègue considers dipsomania and alcoholism to be two distinct diseases. "Dipsomania and alcoholism," he says, "are distinct diseases without analogy, contrasting in their etiology, their progress, their symptoms, their termination, although they both arise on the common ground of abuse of alcohol." ("Medical Studies.")

But this opinion is not generally admitted in England. Bucknill and Hack Tuke ("Treatise on Insanity") admit that alcoholism may give rise to dipsomania, and, with Hutchinson, distinguish three varieties of dipsomania, thus:

1. Acute dipsomania supervening after hemorrhages, venereal excesses, unusual fatigue, in convalescence from grave fevers. The attack having expended itself, it may possibly recur or it may never appear again.

2. Periodical dipsomania, with intermittent paroxysms, separate by shorter or longer intervals of sobriety. This form corresponds to the definition of dipsomania generally current in France.

3. Chronic dipsomania. An almost constant condition, without intervals of lucidity. The patient daily deplores his excesses, promises to reform, and again succumbs. This form occurs in habitual drunkards, in whom habit has created a tyrannical craving, an uncontrollable yearning, which fetters them to its gratification.

Magnan entirely rejects this view of the subject. According to him, acute dipsomania is merely an accidental appetite, which has no point in common with paroxysmal, intermitting dipsomania, which reappears always with the identical features. Periodical dipsomania is the only true dipsomania. Chronic dipsomania he considers as alcoholism.

The alcoholismics as well as the dipsomaniacs may and often do sincerely deplore their excesses, and promise "never to do so again," and even resist their craving for a few days, after the manner of the dipsomaniacs. But we are, all of us, acquainted with repentant drunkards, who make sacred promises of total abstinence to their relatives and to their doctors, and accept their bitter medicine, up to the moment when a favorable opportunity gives them access to their old enemy (Magnan).

Ball approaches more closely to the opinion of English authors, although he admits but two varieties of dipsomania.

1. The hereditary form, which is dipsomania as interpreted by Magnan.

2. The acquired form, which is the chronic dipsomania of the English. The cases are alcoholists, who, by long habit, have created an artificial necessity, which manifests itself from time to time by irresistible impulses, more violent than the natural and habitual thirst for drink.

According to most authors, at least in France, dipsomania and alcoholism have no connecting link. We contend that this opinion is too exclusive; that between paroxysmal, intermittent dipsomania, which is essentially hereditary, and acquired alcoholism, occurring under influence of an occasional and, to a certain extent, sporadic cause, in which the acquired constitution of the individual exercises a stronger influence than his hereditary constitution, there is field for intermediate conditions, or rather for one intermediate condition, involving different degrees. This condition is alcoholism by heredity, approximating, in many features, the chronic dipsomania of English authors.

How do the facts bear out this view? Heretofore, following in the footsteps of many predecessors, we have sought to demonstrate the fact that in certain cases alcoholism is hereditary; that is, that it had no recognizable cause except heredity, whether in similars or in dissimilars. Admitting this, we find ourselves confronted with subjects of a real disease, who have become alcoholists only because they have been driven to drink by a fatal predisposition. The characteristic feature in them is the impulse—an impulse which it is impossible to ignore. We cannot mistake its seriousness when we meet, for example, the proneness to strong drink in very young children: instances of this predisposition will be given and we are forced to the admission that this impulse is a result of heredity. Finally, alongside of this permanent hereditary propensity we meet a condition of mental degeneration, often associated with it, which is found also in the progenitors, sometimes with other taints of degeneration.

Let us compare this etiological sketch with that of dipsomania. We find, in the first place, the irresistible impulse. This impulse is often, in a certain category it is always, heredi-

tary: dipsomaniacs beget dipsomaniacs, as alcoholismics beget alcoholismics. With this proneness to drink, we find in the indvidual and his progeny other taints of degeneration.

Thus, in both classes, we deal with degenerates with hereditary impulse, and this impulse manifests itself by the same bearing on the same object—alcohol. And it must be borne in mind that, in both dipsomaniacs and habitual drunkards, it is not the proneness to drink alone which characterizes them; but it is the impulse to drink alcoholic liquors.

Wherein, then, lies the difference between hereditary alcoholism and dipsomania? It lies in the following distinction, which is no doubt of capital importance, but which is less distinctive than is generally claimed, namely, that the dipsomaniac acts at intervals; whereas the alcoholismic yields continuously to his impulse. The one succumbs to a propensity, transitory, paroxysmal, intermittent, but irresistible during the access. The other, on the contrary, yields continuously to a factitious necessity, against which his reason could contend successfully. Furthermore, at the moment of the attack, the general condition of the dipsomaniac is noticeably peculiar: he is melancholic, anxious, with despair he resists the impulse which besets him; he promises in vain that he will not yield, hopeless that he will not recommence; he even attempts escape by suicide. Nothing of this sort appears to exist in drunkards by heredity; but this appearance is superficial and deceptive. Let us examine the cases more searchingly.

Is the intermittence of the paroxysms typical of dipsomania exclusively? No. The drunkards also act by spells, veritable attacks, at least in the commencement, if not throughout his course. The slang expression "on his periodical spree" applied to habitual drunkards who indulge in occasional excesses, often at regular intervals, suggests the popular observation of this alternating habit. When their alcoholic habits are continuous, then, instead of occasional excess or increase, which challenges attention, there occurs uninterrupted abuse, which passes without special notice. Lasègue, imagining a tracing of these excesses in habitual drunkards, says, "they would be represented by an undulating line, rising in its aggregate course; as distinguished from the dipsomaniacal curve, which would record a series of somersaults."

These quotations suggest paroxysmal phenomena akin to

those of dipsomania; although differing from it in a feature to which we will presently return. The family resemblance becomes more striking when the dipsomanical paroxysms, instead of being intermittent at long intervals, become remittent. If, between their paroxysms of drunkenness, the alcoholismics remain hard drinkers, the dipsomaniacs, between their attacks, never entirely recover a normal condition; but in the intervals remain still dipsomaniacs. As confirmatory of this view, we refer not only to our own observations, but also to the high authority of Magnan, from whom we quote: "If dipsomania be classed as a paroxysmal disease, it must, none the less, be admitted that it is rather remittent than purely intermittent. Undoubtedly the subject is entirely different from himself, as examined during a paroxysm, and as seen in the interval of remittence; but many such cases, even in their lucid intervals, behave like veritable insane. Most of them are ill-balanced, cranky, of whimsical disposition, hot-headed, with a tendency to melancholy."

Another point of resemblance between dipsomania and alcoholism by heredity is the generally gradual transition of their paroxysms from intermittence to remittence as the disease progresses.

Let us compare the general dispositions of alcoholismics and dipsomaniacs. Dipsomaniacs are said to be melancholic, hot-headed, often inclined to suicide. Cannot the same be said of habitual drunkards? Are gayety, consecutive reasoning, and mildness characteristics of the inebriate? The cases of alcoholism which we have discussed in this essay, and which we have reported with a minuteness which might, at first, appear unnecessary, will show how often violence, anger, brutality are met with among them. Is not the tendency to suicide almost characteristic of alcoholism, in so far that the latter is probably the most frequent cause of this crime, not only in France, but also in other countries; and that in presence of suicide, it is necessary always to seek for alcoholism among the causes which may have brought it about?

But it may be said, the alcoholismic, even when drinking to inebriety, could, if he chose, keep from drinking; the dipsomaniac does so choose, but cannot accomplish it. He endeavors to do so by all possible means, and these efforts cause him real anguish. The alcoholismic, on the other hand, most

frequently makes no effort whatever. This is assuredly an exaggerated picture. The individual who commences to "get drunk" may, on the contrary, try to resist the temptation at the beginning; and this is precisely what does occur under the remonstrances of his family and the warnings of his friends, who try to shame him out of his growing vice. Does he not suffer pain (though probably not to the extent of anguish) in the efforts he makes to reform and to avoid relapse? We believe he does. We cannot admit that so strong a propensity, a hereditary predisposition, can be checked without painful as well as earnest effort, when even acquired habits sometimes prove eradicable. Ask the gambler if he feels no anguish when he strives to resist the temptation to join the players at the gaming table before him. Ask the smoker if he is not compelled to use every available argument, and sometimes to have recourse to stratagems, to shield himself from the allurements of tobacco. Ask even the habitual walker, who takes his daily exercise, if he is not actually incommoded when circumstances prevent him, and whether this privation does not sometimes cause him, not only a mental discomfort, but even a physical pain. We contend that no habit is contracted which does not also entail a painful feeling whenever the attempt is made to break through it.

The case becomes much stronger when this habit has been implanted upon an inherited predisposition and fostered by an unconscious impulse. And thus alcoholismics as well as dipsomaniacs endeavor to resist their propensity; in each the effort is painful and gives rise to despondency; in both the attempt to conquer is ultimately a failure, despite the urgency of their reason, their duty, and their natural sentiment. The alcoholismic by heredity, like the dipsomaniac, repents of his misdeeds, and promises never to repeat them; but this prevents neither the one nor the other from relapsing, during their paroxysms, into his former excesses. Between the two classes there is only a difference of degree in their tribulations and sufferings; and to this difference may be attributed the special courses of the two diseases, which, however, run on in closer and closer approximation, as they progress.

In the dipsomaniac the impulse is extremely violent and abrupt. The patient succumbs to it at once, as completely as may be. In the alcoholismic it is less overpowering and,

although likewise abrupt, it appears to proceed progressively, and the effects developed in the afflicted who succumbs for the first time, have not the same intensity as in the parallel case, because the impulse has been less.

After a time the attack of dipsomania disappears, and the patient gradually returns to his normal condition, and after a while the transitory intoxication or poisoning also disappears. The alcoholismic does not at first intoxicate himself continuously. Under the influence of his inherited impulse, the young workman may allow himself to be led astray. During two or three days he indulges in his "first spree," then of his own accord he resumes work and discontinues his excesses. Relatives and employers warn him, and he remains quiescent for a period.

The only difference between the two cases lies in the intensity of the exciting cause. The violence and abruptness of the dipsomaniac's attack are noticed on account of their intensity. Owing to this very intensity the patient, as yet in full possession of his faculties, becomes alarmed at its consequences; he resists, and when overpowered he conceals himself, to surrender and succumb.

On the other hand, with the alcoholismic by heredity, the impulse being weaker, attracts little attention from either the subject or his environment. The individual is not alarmed at the possible consequences of his indulgence if he yields to it; what may happen to him has already happened to many before him. Why then should he strenuously resist? Why hide himself to do that which so many others do openly? And the latent alcoholismic begins to drink deeply. Thus the dipsomaniac and the alcoholismic act in a reflex manner, and obey the great physiological law, that reaction shall be in direct proportion to the exciting cause. That they react differently is because the excitation is different, viewed from a psychical standpoint.

But if, at first, the intensity of the impulse stamps a difference upon the manifestations of the dipsomaniac and the latent hereditary alcoholismic, this difference does not continue long before a new element intervenes. Owing to their intensity the dipsomaniacal paroxysms recur less frequently than the impulsive tendencies of the hereditary alcoholismic. Hence, in the first category, the dipsomaniacal paroxysm once passed,

time is allowed for the organism to eliminate the ingested alcohol; while, in the second category, the repetition of the same occurrences follows too closely and rapidly to leave the needful time for elimination in so large a degree.

A paroxysm of dipsomania, when spent, permits, in incipient cases, the patient to recover unscathed from the alcoholic intoxication. But occasional excesses, by their frequency, may keep the alcoholismic continuously under the influence of the toxicant. A new attack aggravates but little the condition of the dipsomaniac, from an alcoholic standpoint; whereas, new excesses, continuously adding their effects to those of previous indulgences, remarkably aggravate the condition of the alcoholismic.

Thus, in the progress of our study, we find ourselves in presence of two individuals; the one is intoxicated and the other is not. Starting from this point, the accidents which they will incur will be necessarily and deeply modified by their respective bodily condition.

Why should the dipsomaniac, after his fifth attack, react differently from what he did after his first, if the excitation is the same? His condition of mind and body, between attacks, is about up to his usual standard, and the organism on which the impulse repeats itself is unchanged. On the other hand, how can the alcoholismic continue, after a lapse of time, to react after an attack as he did at the commencement, when he is now, in both body and mind, weakened by his antecedent, uneliminated intoxicant?

The answer to this question makes it clear that the more and the longer the alcoholismic intoxicates himself, the more he widens the breach between him and the dipsomaniac. The more his intoxication permeates him the more his mental level is lowered; his moral sense is lost; his affectivity diminishes and disappears; his sensibility is blunted. How can such an individual resist more successfully his imperative impulses when strengthened by habit, than he could when young and comparatively sound in body and in mind; in which condition he was vanquished by his propensity alone? The more the intoxication advances, the less powerful become resistance and repentance, and the more frequent the excesses of morbid indulgence; until at last the state of drunkenness appears as a continuous condition. But in reality it is never continuous,

but always paroxysmal, even in inveterate habitual drunkards. No man could endure such paroxysms for any lengthened period: he must inevitably succumb to this strain of the vital forces. Habitual drunkenness is not more continuous than remittent dipsomania when its paroxysms occur at very short intervals. And here we call attention to another feature common to dipsomaniacs and alcoholismics: in both the tendency is to approximate and especially to increase their excesses. The dose necessary to assuage a first attack of dipsomania is quite insufficient to relieve the tenth; and, similarly, whereas two glasses of absinthe will produce drunkenness in an alcoholismic at the beginning of his career, six such glasses would barely affect him when he has become a confirmed drunkard.

Although dipsomania, in its earlier attacks, is very different, in appearance at least, from inveterate alcoholism, it approaches it markedly when the dipsomanial attacks become very frequent, remitting at very short intervals. In such cases the dipsomaniac has not the requisite time to eliminate his alcohol; he intoxicates himself, and if his excesses are repeated in rapid succession, his intoxication proceeds apace, and eventually induces alcoholic delirium. In all cases his mental status becomes profoundly debased, as that of the alcoholismic.

There occurs in the hereditary alcoholismic something similar to what takes place in the morphinomaniac. The latter, too, tries to conquer his fatal habit; but the habit has grown into an imperious, uncontrollable need. Abstention, even when backed by an unyielding will, brings on as much trouble and suffering to this patient as resistance does in the dipsomaniac. At times the morphinomaniac appears to repent and to return to reason: but he again relapses; and his indulgences occur likewise in paroxysms. Like the dipsomaniac, he at last takes his gratification in secret, he sells his all, and even steals to procure the wherewithal to gratify his passion. But, as with the alcoholismic, the more he yields the less becomes his power of resistance.

Such is the course of a passion, essentially an acquired propensity, created by habit and by the enjoyment of its gratification; how much more irresistible must be the craving of a temperament, not self-created by its own volition, but implanted in the victim by inexorable heredity!

We have dwelt at considerable length upon the resemblances and the contrasts between dipsomania and hereditary alcoholism. We have done so because we believe that the distinction between these two forms of disease has generally been laid down too broadly. We have, of course, not attempted nor intended to make any comparison, and still less to point out any approximation of dipsomania, as generally recognized in France and as admitted by ourselves, with alcoholism in its vulgar, acquired form. This is far from our design.

Nor have we the intention to confound dipsomania with alcoholism by heredity. What we have endeavored to demonstrate is that the difference between these two conditions arises simply from an inequality in the intensity of the original impulse, and that it is this original difference which effects the diverging evolutions of hereditary alcoholism and dipsomania. And we believe that, between dipsomania (as recognized by the schools) on the one hand, and acquired alcoholism on the other, there is room for a distinctive group of alcoholics whose relations to alcohol resemble those of the morphinomaniacs to morphine; with this capital difference, that their proneness is hereditary, and by this characteristic they approximate directly to the dipsomaniacs.

We would classify drinkers of alcoholic liquor into three groups, viz.:

Hereditary	Dipsomaniacs.	Not continuously intoxicated.
Hereditary	Alcoholics by heredity (alcoholismics).	Continuously intoxicated.
Non-hereditary	Alcoholics by acquirement.	Continuously intoxicated.

It is admitted and incontestable that dipsomania is hereditary, not only in the sense that the subjects are degenerate by heredity, but in the more emphatic sense that dipsomaniacs are often the progeny of dipsomaniacs. What occurs in dipsomania, we have already shown to occur likewise in alcoholism and it is this feature which identifies alcoholism by heredity. Heredity is the strong, characteristic link which joins these two states of being, which we have endeavored to bring into juxtaposition by a careful analytical and comparative study of their manifestations. Heredity is the capital essential point which dominates their history. Their relations will

become still more strikingly manifest when we establish that hereditary alcoholism and dipsomania may supplement each other; this latter being able to produce the former in its progeny. No better proof could be adduced of the identity in nature of these two syndromes. The correctness of this view, which is in opposition to the general opinion, can be tested only by reference to the facts upon which it is based.

Upon this delicate point, which powerfully supports the opinions we have advocated, it is, of course, preferable not to cite facts of our personal observation, but to seek confirmation from high expert authority. Magnan furnishes us the first example of dipsomania begotten by hereditary alcoholism ("Lessons on Dipsomania," p. 95).

CASE XVIII. (Magnan).—Louise B., age 33 years; hereditary insanity; daughter of an alcoholist whose father committed suicide. Her mother appears to have been intelligent. A brother died at 5 years of hydrocephalus. A cousin is insane. At age of 8, the patient had an attack of typhoid fever, followed by dulling of the intellect and loss of memory. At age of 20, periods of sadness and depression, vague pains, aggravated at the menstrual period, calmed by a little sweetened wine. Married at 24; soon after she became pregnant. During third month of gestation, sadness without cause, weariness, lassitude, incessant thirst, relieved at first by infusion of mint, then by wine, and at last by brandy. The relief derived from this led her to drink more; in short, from this time she becomes subject to frequent attacks of dipsomania with melancholy and suicidal tendency.

CASE XIX. (Magnan).—Louis H., age 35 years; sculptor; son of a drunkard father (who attempted suicide) and an hysterical mother. He has always been inclined to sadness, and of late to suicide. He commenced at an early age to use alcoholic drinks freely; he noticed that he committed his excesses when his melancholic thoughts were becoming more oppressive; by the morbid condition in which he found himself periodically, he explained the frequent attempts at suicide; these always followed an attack of dipsomania. He has had also several spells of alcoholic delirium.

CASE XX. (Magnan).—Pauline H., age 52 years; father an habitual drunkard. She herself commenced to drink hard

at age of 26. At first she indulged to excess only at long intervals, which progressively became shorter until she was finally stricken with alcoholic delirium.

CASE XXI. (Magnan). — Eugénie M., age 48 years; teacher; father an habitual drunkard, chiefly of white wine. Maternal grandmother drowned herself. Patient at age of 20 manifested religious insanity, onanism, attempts at suicide. At age of 28 she commenced to drink hard, and soon brought on attacks of dipsomania, with homicidal tendencies.

We here add one of our personal observations from the same pathological standpoint, showing an entire family in which the heredity is manifest, and where dipsomania supervenes in the generation next following that in which alcoholism had displayed itself.

CASE XXII. (unedited). — Carben., age 16 years; idiocy, symptomatic of cerebral sclerosis; epilepsy. On father's side, nothing noteworthy, except uncle very nervous. Mother nervous, violent fainting fits in early part of her pregnancies. Maternal grandmother died at age of 54, from effects of numerous alcoholic excesses. At intervals of two years she had been seized with a violent craving for strong drink, particularly brandy. The attacks lasted from 15 to 30 days. She resorted to all sorts of tricks to procure the means to gratify her appetite. The attacks occurred repeatedly two or three weeks after child-birth. She had, in all, fifteen deliveries. Paternal great-grandfather nothing notable. Maternal great-grandmother, when young, drank a great deal, but not in spells, as the grandmother (her daughter). Maternal cousin-german imbecile. Maternal aunt died of meningitis at age of 15. "Grand cousin-german" (sic) hung himself at age of 20, after commission of a theft. Second cousin of the mother has been insane for six months.

In a large proportion of the cases of dipsomania we have found in the progenitors taints of degeneration or of alcoholism, more frequently the latter. Alcoholism of the parents may, then, procreate dipsomania in the offspring, as it would alcoholism. This shows the closeness of the tie which binds them. Dipsomania appears to us a more pronounced stage

of degeneration than alcoholism, of which it might be considered the culmination.

This opinion that dipsomania is an advanced degree of hereditary alcoholic degeneration receives confirmation from the observed fact that dipsomaniacs do not beget alcoholismics, although we have just seen that nothing is more frequently observable than alcoholism in the progenitors of dipsomaniacs. If this opinion be correct, it explains most naturally the occurrence noticed. It is logical that the offspring of a degenerate, of whatever degree, should be more degenerate than its parent, the degeneration increasing by procreation, except in case of an alliance which brings to bear energetic influences corrective of the hereditary degeneration. To assume the contrary would be to ignore the facts, to misinterpret the logic of events, and we could not understand how the successive degenerations, if they were not progressive, could produce the undeniable extinction of the race, in the course of a very limited number of transmissions.

It is worthy of notice that the advocates of absolute separation between dipsomania and alcoholism are not always consistent with their own theory. Legrain who, in his essay, advocated the opinions of Magnan and his school, after having argued that there could be no possible correlation between the two conditions, points out that almost all alcoholismics are degenerates, and that many degenerates are alcoholists; then generalizing still more he adds: "Thus, then, at the root of all the forms of alcoholism we find mental degeneration. The mental condition of the drunkard, who exposes himself shamelessly to the mockery and scoffs of every one, and does not mend his ways, must necessarily be depraved. As to the sick man who knowingly intoxicates himself, without ever restraining his excesses, he manifests a weakness of will-power, and a moral perversion, which class him with the unbalanced. Finally, we have in the first part of our work considered dipsomania as an abnormal impulse characteristic of mental degeneration."

We will not pause to ask whether the alcoholismics of whom he speaks are degenerate and of an inferior mental level because they are alcoholists, or whether they are alcoholists because they are unbalanced and of an inferior mental level. An affirmative answer to one or other of these inquiries

would singularly change the state of the question. We point only to this one admission, that at the root of all forms of alcoholism mental degeneration is to be found; and that dipsomania, one of the most characteristic signs of mental degeneration, is one of the forms of alcoholism.

This seems the conclusion to be drawn from the lines we have quoted. Our position, then, is not so isolated as might be feared, when we have approximated dipsomania and inherited alcoholism—two morbid conditions which have the same origin—heredity, and the same objective—the drinking of alcohol.

Heredity of Taste for the Same Drink.

Not only may the progeny of alcoholists be alcoholismic, but they may inherit even the predilection for the same kind of drink as their progenitors. This fact had long since been casually noticed by ancient writers; it struck us forcibly, because it shows the thoroughness with which the alcoholic heredity permeates the individual. We have already had an instance of this in case XIII., in which the parent who indulged, by preference, in brandy only, bequeathed to his son (the father of the subject) not only his drunken habits, but also the special taste for brandy. (Notice the grandfather and father in the case cited.) We adduce, also, the following instance which has come under our notice.

Case XXIII. (unedited).—Bull., age 14 years; idiocy; father died at age of 42, having hung himself; drank largely of absinthe, especially since 1870. Upholsterer by trade; not violent when in drink; drank white wine in the morning. Paternal grandfather wine merchant; drinker of absinthe; died of lung disease. Paternal grandmother nothing noteworthy. Great-grandfather (father of the latter) committed suicide on account of misfortune in business. Great-grandmother (wife of the latter) died of grief at these sad occurrences. Mother, age 35 years, cephalalgia, nervous irritability. Maternal grandfather (son of the paternal great-grandfather) died at age of 52, of galloping consumption; drank to excess, particularly absinthe. Cousin-german (grandson of the latter) excessive drinker of absinthe.

The above example is striking: in the same family we see this heredity manifesting itself in predilection for absinthe on both sides, on the father's side, as between the grandfather and father—and on the mother's side, as between maternal grandfather and his grandson, by diadromic heredity. Similar cases may be met with in the literature.

CASE XXIV. (Taguet).—This author reported a case of a person dying from abuse of blackberry wine ("Cassis"), leaving an infant not yet weaned. This child at an early age showed a tendency to intemperance, and at the present day he is wasting his means in strong drink. His favorite tipple is that of his father.

The influence of heredity in this case cannot be denied. Blackberry wine is not a common drink among habitual drunkards, and it is unreasonable to invoke the influence of example, because the father was dead before the child was able to take cognizance of his excesses.

CASE XXV. (Doursout).—Woman, age 25 years; father alcoholist (on brandy). Paternal aunt barmaid and drunkard. Brother and sister died in childhood. Our subject, continually drunk, drinks a pint of brandy daily. Alcoholic excitement; immoral; beats her parents and husband; incendiary.

CASE XXVI. (Gendron).—Legay., age 49 years; dealer in old books; grandfather hard drinker, died at 65 years. Father habitual drunkard on absinthe, died at 48 years. A brother, also absinthe drunkard, died at 35 years. Four other brothers or sisters died in childhood, some of them with convulsions. Patient has had several; he commenced to drink, while a trumpeter in the artillery, beer, wine, brandy, but, above all, absinthe; vomits frequently for some time past, has hallucinations of sight and hearing; tremors; anesthesia; sexual weakness.

This heredity of taste for the same drink is as remarkable as is the well-known inherited preference for certain forms of suicide, often manifested at the same time of life in the progeny as in the ancestry. Morbid heredity could not be more clearly evidenced, nor show more complete uniformity.

Alcoholic Delirium.

We have seen that alcoholism may be transmitted from one generation to the following, in its identical form. This leads us to inquire whether heredity exercises any influence upon the forms of the manifestations, whether organic or psychical, of the transmitted alcoholism. Will a certain alcoholismic incur a greater liability to the development of hepatic scirrhosis, because his father, likewise alcoholismic, suffered and died from that disease? Or, again, will a certain alcoholismic have a greater tendency to alcoholic delirium, because in his progenitors alcohol has particularly attainted the nervous system; or because they presented, beside alcoholism, appreciable taints of neuroses or vesaniæ?

Upon the first of these points we have found no data in the literature, nor have we any observations of our own to demonstrate it. Upon the second point, which is of much more importance, we have very interesting data. Of all the cerebral manifestations of alcoholism, the most important by its frequency is "delirium tremens." What influence does heredity exert upon its development? We shall first review the opinions of other authors, and then seek to corroborate the views which we believe to be correct.

Lasègue describes as predisposed to cerebral manifestations of alcoholism, three groups of subjects, viz., those with hereditary tendency, the deformed, and those with acquired cerebral disease.

Ball is equally clear in his views. He says: "Let us observe an individual without hereditary predisposition, who takes to drink, whether urged thereto by the necessities of his business or for the purpose of exciting himself, and who acquires the habit. If he is in robust health, no serious damage results. If he is arthritic, he will bring on some organic attack. If he has a neuropathic inheritance, then his nervous system will be the seat, by preference, for morbid manifestation. It is the alcoholic victims who, because they are neuropathic, furnish the largest number of cases of alcoholic insanity and who are most liable to delirium tremens."

We shall now quote in full all that Magnan says concerning this predisposition to delirium tremens: "The persistence of the delirium, after termination of the acute stages of the

attack, is noticeable in alcoholists of special predisposition of that kind of predisposition specified by Moreau in his 'Morbid Psychology' and to which Laborde calls attention in a recent work. The cerebral inferiority of these patients may be accounted for most frequently by heredity. But there is also another group, comprising those cases which, by oft-repeated indulgence in alcoholic excesses, have created for themselves a morbid susceptibility or predisposition to the disease. Bearing this in mind, it becomes interesting to notice their intellectual condition at each of their successive entrances into the asylums. At each relapse a change may be detected, the patient sinks gradually to a lower level on the intellectual scale, and at the third or fourth relapse it is not unusual to observe blunted and weakened faculties behind the manifestation of alcoholic delirium.

"In this group of patients, alcoholic drinks act differently from what occurs in others; at each relapse we find a distinct delirium, accompanied by less-noticed disorders of the locomotor faculties; there is not that proportionate correlation between the physical and mental symptoms which general experience would teach us to expect. In these alcohol victims, the nervous system seems to throw itself open to attack; the whole intellectual apparatus takes on excessive susceptibility, while the somatic functions continue their normal duties, with little interruption. There is defect of equipoise and this becomes conspicuous by observing the phenomena which occur under a like agent. In animals, as in men, the imbibition of alcohol gives rise to physical and to intellectual phenomena; these usually progress together; they continue parallel in their increase and their expansion; this symptomatic consensus indicates a generally uniform action of the poison on the entire cerebro-spinal system. But if the equilibrium be disturbed, then even a small dose of the poison may vividly impress the brain in its intellectual function, while it only feebly excites the physical functions dependent upon the spinal cord, or belonging to the nervous system of organic life; and these last-named manifestations may even not exceed their normal activity. The remark just made as to sensitiveness to intellectual phenomena may also apply to other morbid manifestations; and it is, in fact, a general rule, that the weakest organ in the subject is most

open to attack and yields most readily to impression, under most diverse conditions." We quote here the two cases which Magnan adduces in confirmation of the opinions expressed.

CASE XXVII. (Magnan).—L. Desiré, age 28 years; son of a drunkard father and a consumptive mother; between 12 and 20 years of age he committed several petty crimes. At this age he had commenced to drink; he slept restlessly, and frequently had nightmare. At 20 years he had an attack of typhoid fever, after which his excesses of drink became habitual; he grew irritable and quarrelsome. At 21 years had his first attack of alcoholic delirium. He was confined at Bicêtre, and discharged cured at the end of four months. He soon relapsed into his former habits, and had a second attack of delirium, for which he was re-admitted into Bicêtre. Up to date, he has been seven times admitted to various asylums, each time for alcoholic delirium. Under complication of an intercurrent cause (as a gastric disorder) he has become subject to hallucinations and delirium.

The following case is more characteristic of the susceptibility which we are now considering. The subject in question is nervous, not only by his own idiosyncrasy, but still more so by that of his family, both present and past, and is thereby rendered liable to cerebral localization of alcoholism.

CASE XXVIII. (Magnan).—J. Jean, age 27 years; father was melancholic, given to excesses in strong drink and finally committed suicide by poisoning. Patient had six brothers. Of these, the eldest led a life of disorder and excesses; he dissipated the family property. The youngest, now 23 years old, has had convulsions in childhood, is weak-minded, and affected with strabismus. A third brother is in good health. A fourth brother died of some intercurrent disease. The remaining two died of convulsions. Patient has had two children born to him from a mistress. One of these died at birth. The second died at 7 months, with rigidity of the trunk and jactitation. Patient has always been sad, gloomy, easily impressed. He has had dreams and nightmare since childhood; was early addicted to strong drink; his excesses became more frequent in 1870. Insomnia, agitation, hallucinations, under influence

of which he has attempted murder. Had an attack of alcoholic delirium, for which was sent to an asylum; after seven months was discharged cured, and resumed his trade and his drinking habits. Shortly afterward another attack of delirium sent him again to the asylum. The alcoholic attacks were relieved, but they left behind hallucinations and fear of imaginary persecutions.

We find similar observations in the essay of Legrain.

CASE XXIX. (Legrain).—Patient is affected with mental debility, age 28 years. Habitual drunkard of long standing; admitted to St. Anne Asylum, with alcoholic delirium. Father, æt. 58, hemiplegia; sister died of tuberculosis at 16 years. Brother, æt. 26 years, weak-minded; unable to learn either to write or to read. Two other brothers and one sister are in nearly the same condition. Maternal grandfather alcoholist; epileptiform attacks have followed his excesses from a certain period in his life. Mother weak-minded, exaggerated devotion, nervous temperament.

To the diadromic ("indirect") heredity of alcoholism (from the maternal grandfather to the patient) there is superadded in this case an hereditary susceptibility, as manifested by the epileptiform attacks of the grandfather, the nervousness of the mother, the hemiplegia of the father, and the weak-mindedness of the brothers and sister. In such a patient alcohol must inevitably strike its heaviest blows upon the nervous system thus predisposed.

We concur in the opinion of those authors who consider heredity to be one of the most effective predisposing factors in the development of alcoholic delirium. This tendency to develop a toxic delirium should in no way surprise us, when we observe that alcoholism provokes, in degenerates, a delirium of a different kind, either before or concurrently with the alcoholic delirium. This intercurrency is well shown by Magnan and Dericq.

We have examined the records of a large number of cases of delirium tremens, with a view to ascertain to what class or classes of alcoholists they belonged; were these acquired alcoholists or were they hereditary alcoholismics?

In many we have found the delirium the consequence of

dipsomania (Magnan, Galangau, Gabriel). In the majority of cases in which the ancestry had been noted, the patient was almost always the son or descendant of an alcoholist, consequently a hereditary alcoholismic. It is to be regretted that, in many cases, where alcoholic delirium has supervened upon traumatisms, neuropathies, acute diseases, no note has been taken of the progenitors. In cases where the delirious patient was not descended from alcoholist parents, it was found that the parentage, on one or on both sides, was neuropathic or vesanic or degenerate, and that the alcoholism of the patient was traceable to his morbid nervous inheritance. We are, therefore, thoroughly convinced that heredity is the principal cause of alcoholic delirium, and we add the belief that heredity in similars is a preponderating factor in this causation.

In the following case ("Ann. Méd. Psych.," 1846, p. 466) we recognize both the alcoholismic and the neuropathic heredity.

CASE XXX. (Blanche). — L. A., age 57; workwoman; married; admitted to Salpêtrière on August 27th, 1846. Father epileptic; mother alcoholic. Patient irascible, violent when excited; menopause at 50 years. From this period she has indulged in excesses of strong drinks, wines, brandy, and principally absinthe. Two years ago she took a loathing to wine, and drinks brandy by preference. These abuses have developed alcoholic delirium with ideas of persecution and hallucinations of all the senses. On account of these she was admitted to the Salpêtrière.

CASE XXXI. (unedited).—Halle., Theod., age 17; epilepsy. Father, day-laborer; drank two quarts of wine daily; took two strong drinks in the morning, drank cognac in his coffee, but was rarely drunk; he was subject to rheumatism, had an attack of delirium tremens, for which he was admitted to St. Anne Asylum; after his discharge had another attack. Paternal uncle died of lung disease at 34 years; he was a heavy drinker. Paternal aunt phthisical. Paternal uncle heavy drinker. Paternal grandfather has "always drunk" freely, especially cider and apple brandy (he is a Norman). Cousin-german insane.

CASE XXXII. (Séglas). — Mme. R., age 30. Father alcoholist; died in a state of drunkenness. Paternal uncle died

"crazy from alcohol." Brother drunkard. Patient had convulsions in early childhood; very nervous at age of puberty; weak intellect, irritable, malicious, violent; laughs and weeps without appreciable cause; has never had nervous fits; has had one premature labor without bad complications. Four years ago she formed a dangerous acquaintance, that of a woman who taught her to tipple; this influence escaped notice at the time; eighteen months ago she attempted suicide with laudanum, but was relieved by medical aid; since then she has taken to drinking very much brandy, gin, rum, etc.; has given up all occupation, neglected her person, forsaken her housewifely duties; is violent, drowsy, yet suffering from insomnia; she drank in secret, and denied that she indulged; she became unrelievably thirsty and could not keep from drinking. At present she has alcoholic delirium, insomnia, passing hallucinations, generally of distressing character; thoughts of suicide (she refuses food); hypochondria (she imagines certain parts of her body to be dead); dissimulation, falsehood, loss of affection and moral sentiment; violence, tremors; no anæsthesia or hyperæsthesia; chronic gastric catarrh, dyspepsia, anorexia.

Alcoholismic heredity is manifest in the above case. The patient's father and uncle are alcoholists; her brother also is alcoholismic. As to the tendency to alcoholic delirium, may we not strongly suspect some influence of heredity from a more remote generation, when we see, beside the father's alcoholistic slavery, the death of the paternal uncle of an alcoholic general pseudo-paralysis, or may be by an attack of delirium tremens, in either case by a cerebral manifestation of alcoholism?

It would be easy to multiply such cases, but it is unnecessary; our case is proven. Alcoholists by heredity have a greater tendency to alcoholic delirium than alcoholists by acquirement, whether the progenitors of the former were themselves alcoholists, or whether they were neuropathic, or insane, or degenerate. In either case the resistance of the cerebro-spinal system is weakened; it is rendered more susceptible to morbid impression, and becomes a "locus minoris resistentiæ," upon which alcohol must act fatally, and in preference to any other point.

General Paralysis.

We will not dwell further upon the inherent tendency of hereditary alcoholists—greater than that of any other alcoholist—to develop general paralysis, or a complication of epileptiform accidents, as a termination to their intoxication. It is long since Morel first noted the great frequency with which young men, previously of sober habits, suddenly became alcoholists, and ended their career in general paralysis. Magnan, in his book on alcoholism, has shown that chronic alcoholism could in certain cases terminate in general paralysis. But, unfortunately, no notes of hereditary ancestry are mentioned in any of the four cases which he quotes, excepting one, in which the subject had an uncle who was insane. This may be construed as indicating the probable existence, in the family, of some heritable cerebral degeneration. Magnan does not touch the question of the conditions which may predispose the system, in alcoholists, to the development of paralysis.

We shall not review the relations between alcoholism and general paralysis; it would be out of place in this essay. We think, however, that it is pertinent to call attention to the remarks of Lacaille, in treating of alcoholic general pseudo-paralysis. After describing a certain group of symptoms, he explains that these morbid phenomena manifested themselves in certain alcoholists under observation, and that they were developed in them in consequence of their intoxication. It matters little for our present purpose to know whether the especial symptoms observed constituted a case of orthodox general paralysis (of the books) or whether the disease was only a group of symptoms analogous to and simulating the genuine. The latter is the opinion of Lacaille. He suggests no distinction among his alcoholists, as to whether they were of hereditary or other origin. Regis, who collaborated with Lacaille, says, in his book, "Alcoholic general pseudo-paralysis occurs constantly in 'cerebral,' confirmed alcoholists. It commences in them in one of two ways: In some cases it is preceded by apoplectiform attacks; in other cases (and this is the more frequent occurrence) the general pseudo-paralysis follows a subacute attack of alcoholism." Regis says nothing about heredity, but the qualification

"cerebral" which he applies to the alcoholists of his group, identifies the class of patients considered.

Bonnet, in a medico-legal report ("Ann. Méd. Psych.," 1871, vol. 2, p. 198), cites a case showing the influence of neuropathic heredity upon the development of alcoholic general paralysis.

CASE XXXII. (Bonnet).—Hoss., Auguste. Paternal grandmother has always been weak-minded. Father has not only been always weak-minded, but he has once been actually insane before his marriage. Patient is weak-minded, with perverted instincts. His manner of life was, at first, regular and laborious. Suddenly he commenced hard drinking without any assignable cause and soon became a confirmed drunkard. Thenceforth his actions became extravagant; he had true maniacal attacks, and finally committed incendiarism without cause or purpose. and was imprisoned on account of this crime; subsequently he became a general paralytic.

We add a case observed by ourselves of an alconolist, belonging to an insane family, developing general paralysis.

CASE XXXIV. (unedited).—Cres., age 18 years; epilepsy, failure of intellect. Father died at 32 years, an inmate of the asylum at Mont de Vergnes; for the last fifteen months of his life he was affected with general paralysis; he was an extreme alcoholist. He drank, on a wager with his friend, as to who could consume most absinthe; he drank also champagne and brandy; for some time prior to his attack of paralysis, he drank habitually a quart of absinthe per day. He was already a hard drinker at the time of his marriage, and subject to severe headaches, with vomiting. A few days after his marriage it was perceived that his manner was strange, his ideas extraordinary; his household goods were seized by a legal process; he appeared to take no notice of it. Paternal grandfather very violent; has hallucinations, is "mystique" (spiritualist?). Paternal grand-uncle, a curate, became insane and was confined at Mont de Vergnes. Another paternal grand-uncle had delirium of persecution; committed suicide by drowning; his children died of lung disease; one of them was subject to nervous fits. Two paternal aunts, religious monomaniacs, gave all their property to the church. One brother has

convulsions: was born with "a web in his eye;" another brother died of brain fever; he, also, was born with "a web in his eye." Sister had convulsions during progress of typhoid fever. Two brothers and one sister are in good health. Patient was begotten during drunkenness of his father, who indulged in marital intercourse at such times by preference.

Among seven observations reported by Lacaille (1881), there are four in which alcoholism by heredity is shown to predispose the patient to general paralysis, as it does, also, to delirium tremens. We shall not recapitulate them in full, as they are of only secondary importance. We subjoin a brief summary.

1. Father alcoholist; son alcoholist; the latter becomes a general paralytic.

2. Father alcoholist; uncle insane; son alcoholist, subsequently general paralytic.

3. Father alcoholist, died paralyzed; two sisters insane; son alcoholist and general paralytic.

4. Father alcoholist; son alcoholist and general paralytic.

In Millet's essay (1880) we find the case of a woman, an alcoholist and general paralytic, whose sister is insane. In Moreaux (1881) we find father apoplectic, son alcoholist and general paralytic. These are cases of heredity, not in similars, but in dissimilars.

In a large proportion of the cases reported by various authors, absolutely no notice is taken of the hereditary antecedents. In others the reference is so vague that we can draw no available conclusions. But in most of the cases where the heredity has been carefully noted, it is found to be in alcoholists by heredity that general paralysis is most apt to develop. Lacaille offers an explanation of the cause which predisposes certain alcoholists to general paralysis, rather than any other cerebral complication. He divides alcoholists into two classes, viz., vesanic alcoholists, who bear well the effects of strong drink, in whom the intellectual symptoms predominate; and cerebral alcoholists, in whom the somatic symptoms predominate. It is among the latter class that general paralysis has a tendency to develop.

This theory seems plausible; we shall not discuss it; it seems almost too simple and convenient. Alcoholic cases are

generally too complex to be readily grouped under so simple a classification. We believe, however, that we may claim it as almost, if not quite, established that alcoholists by heredity are more than others apt to develop alcoholic delirium, or general paralysis, or pseudo-general paralysis, according to the bias of our doctrinal views. This question has been and is still much discussed by many writers, and requires further skilful research for its elucidation.

CHAPTER IV.

INFLUENCES MODIFYING HEREDITY.

WHY should one child, in a given family, become an alcoholist, while no tendency to such hereditary manifestation can be found in any of the other children? We might ask a similar question with regard to any other hereditary affection, or as to any of the recognized taints of degeneration, as, for instance, why should an insane father procreate sometimes an insane offspring like himself, sometimes a degenerate, sometimes an epileptic, or an idiot, or a genius? Why should an epileptic beget another epileptic, or perhaps a child of unstable or perverted mind, an idiot, or an alcoholist? Each special degeneration might be investigated to the same purpose, and all would concur in showing great diversity in the individuality of the progeny from the same parentage.

The one constant feature in all these morbid manifestations of the progeny is that they are all stamped with the impress of heredity. It is this that has enabled Morel to gather his great group of degenerates, who are all connected by this common link of heredity. It has furnished ground to Magnan to individualize, within its scope, his insanity of degenerates, whose various concurrent symptoms are always governed by the same laws. But although the factor of ancestral heredity appears to be constant and invariable, it is not so in fact. Alongside of it there is a second factor which is eminently variable: it is the receptivity of the progeny to the hereditary influence transmitted.

Let us, for example, take the case of an alcoholist. According to the degree of his intoxication at the moment of his begetting them, his children will probably be very differently apportioned in the scale of degeneration. One of them, begotten, may be, during a spell of drunkenness, will present congenital idiocy, or precocity, or hydrocephalus. Diverse

manifestations may be observed in almost every family of hereditary alcoholismics, of which we subjoin an example.

CASE XXXV. (unedited).—Taup., George, age 8 years; idiocy. Father, excesses of strong drink, principally absinthe. Paternal grandfather, alcoholic excesses. Paternal grandmother died of cancer of tongue. Paternal aunt, melanosis. Cousin-german, imbecility, hydrocephalus. Mother, cephalalgias and syncopes, commencing at age 12 to 15 years, and occasional spells of "tædium vitæ." Maternal grandfather, alcoholic excesses. Cousin-german, quasi idiot. Patient begotten during drunkenness; asphyxia at time of birth; giddiness; walked at 2 years; spoke at 2½ years; cleanly in his evacuations at 3 years; persistent convulsive twitches of the eyelids during sleep; vertigo at 6 years; kleptomania. Brother, age 7, idiocy; begotten by father when tipsy, between two drunks; internal spasms at age of 10 days; gnashing of teeth; kleptomania; bites during his fits of anger; malicious toward other children; onanism. Two brothers died of convulsions. One brother died of hydrocephalus.

Another child, begotten while free from drunkenness, may be merely unstable, or perhaps an alcoholismic or perhaps a normal individual; and this last contingency may occur even where the specific toxication of the parent is notably advanced. We subjoin a case in point.

CASE XXXVI. (Hugues, "Ann. Méd. Psych.," 1886, vol. I., p. 203.)—Example of rapid neuropathic degeneration. The family O—— includes among its progenitors no morbid antecedents except drunkenness in the father, and this is only occasional. The family comprised nine children; of these three died in childhood; of the six remaining, three are girls and three boys. Two of the girls are insane; the third is married and has two children, both with neuropathic symptoms; she herself is subject to hysterical fits. One of the sons has epileptic fits and exophthalmus; he has no children. The second son is eccentric, prodigal, and a drunkard; without being vicious, he is very variable and irritable. The last son is the only one who is perfectly normal as to mind and morals; but he is phthisical. This family may be considered as already extinct.

The above is a discouraging record of a drunkard's family. Sometimes the offspring of the alcoholist will be a hereditary degenerate, as in the following case.

CASE XXXVII. (Béclard, "Ann. Méd. Psych.," 1872, p. 221).—V., emotional, nervous. Father inveterate drunkard. Patient becomes so, likewise, after having been for many years sober; at the same time he becomes addicted to venereal excesses, swindling, sodomy, sexual depravity.

In another case, the progeny of the alcoholist may be an epileptic; in another, an insane or a dipsomaniac, as we have seen. But besides those families which present among the children examples of almost every variety of degeneration growing out of the alcoholism of the parents, there are others much more interesting from our present standpoint, in which all the progeny show manifestations of alcoholism itself.

In the following two cases there can scarcely be a doubt of the existence of a hereditary predisposition, although exact information is unfortunately wanting concerning the parents.

CASE XXXVIII. ("Gazette des tribuneaux").—The family Dufay is a very unfortunate one. There were four brothers, all addicted to the most unrestrained drunkenness. The eldest brother committed suicide by drowning. The second killed himself by hanging. The third cut his throat with a razor. The fourth jumped out of a third-story window.

CASE XXXIX. (unedited).—Mill., age 7 years; epilepsy, imbecility; an illegitimate child. Father, white-washer; vigorous; drank heavily, particularly wine, not much alcohol, very rarely absinthe; was often drunk; sometimes very gay, at other times very gloomy during intoxication. Three uncles on father's side are habitual drunkards.

We have seen in Case VI. a woman drunkard who ultimately died of paralysis, after bearing three children, one of whom was a boy, alcoholismic and possibly dipsomaniac; and two were girls, both of them drunkards; one of them is rickety and the other is microcephalic. We will add another case.

CASE XL. (unedited).—Alep., Auguste, age 11 years; idiopathic epilepsy. Father, turner in copper; abandoned his wife; frequent excesses in strong drinks; when in his cups he

is very mischievous; married at 24 years; has always drunk heavily, even in early days of married life. When in normal condition he is of mild disposition. Was a lazy workman; sold out his workshop and drank the proceeds of sale; his wife was obliged to go out to service. Paternal grandfather excesses of strong drink; died of lung disease. Paternal uncle alcoholist, killed during the "Commune" in 1871. Another paternal uncle died of lung disease; excesses of strong drink; alcoholist. A third maternal uncle debauchee.

Beside the individual idiosyncrasy, open to the hereditary influence, we must also consider another element which must inevitably aggravate or diminish the transmitted degeneration, viz., the mother's contribution to the hereditary taint. It would undoubtedly be very interesting to investigate whether the offspring inclines to undergo the hereditary influence of whichever parent it most resembles physically or morally. We have not attempted this research; it would require too much time before we could collect for presentation even a few demonstrative observations. We shall limit ourselves to showing how the heredity of one parent may influence that of the other in the special field of alcoholism.

When, for example, one of the parents is alcoholic and the other insane, the insane factor imparts a tendency to the alcoholismic progeny to become insane, as exemplified in the following observation from Gilson.

CASE XLI. (Gilson).—A man, age 42 years. Alcoholic habits since 18 years; confined in asylums at three different periods for chronic absinthism, with violent manifestations; melancholy; occasionally violent; suicidal tendency. Father addicted to alcohol. Paternal grandmother insane. Mother insane. Maternal aunt idiotic. Brother phthisical.

Gilson adds to this report: "In such a case there is certainly more than imitation on the one hand, and bad example on the other; there is real hereditary transmission of the appetite for alcohol." This appears to us beyond doubt; but we notice in addition the special character given to the manifestations of inherited alcoholism by the concomitant vesanic complications.

In the following observation, alcoholism by heredity is

complicated with tendency to theft, and the inherited taint shows itself at an early age.

CASE XLII. (Doursout). — Patient addicted to strong drink since age of 17; would remain drunk for a week at a time, and sometimes for two weeks; he committed theft during a drunken spree. Father drunkard. Mother demonomaniac.

When alcoholism exists in both parents, the probabilities of deep and rapid degeneration in the offspring are strong.

CASE XLIII. (unedited).—Peti., Jean, age 14 years; hydrocephalus, imbecility. Father æt. 46, day laborer, violent temper, drinks freely of absinthe; even at the time of his marriage he drank two to four glasses daily; he comes home partially drunk five or six times a week, but never so much so as not to know what he is doing; he also drinks wine; between 25 and 33 years he drank most freely, getting drunk on absinthe at least five days out of the seven. After 33 years he became a little more sober; very salacious during his drunkenness and at such times almost uncontrollable. Paternal grandfather, alcoholic excesses frequent, chiefly on wine and brandy. Paternal grandmother died at 60 years; drank very freely; was separated from her husband, whom she abandoned with four children; prostitute, more especially since age of 45 years. Paternal uncle died of lung disease. Paternal grandfather, asthma. Maternal grandmother, cancer of uterus. Maternal great-grandfather, asthma. Maternal uncle committed suicide. Maternal aunt, chronic patient in Salpêtrière Insane Asylum; one of her children was hydrocephalic. Sister has Pott's disease of the spine; another sister hydrocephalic; brother hydrocephalic; died of meningitis.

Thus the alcoholism of the paternal grandparents produced in the father alcoholism by heredity; and this, joined to the nervous heredity contributed by the mother, sufficed to produce the extinction, virtually complete, of the race at the second generation. The following observation is perhaps more impressive, being less complicated with neuropathic heredity.

CASE XLIV. (unedited).— Piq., age 11 years; imbecility; periods of violent insanity; convulsions at 3 years; consecutive

vertigo. Father æt. 37; cabinet maker; drinks (wine) to excess on pay days; never absinthe. Paternal grandfather died of phthisis at 42 years; drank frequently to excess. Paternal great-grandfather died insane. Mother, washerwoman, æt. 33; numerous excesses of strong drink during last 3 years; sober until 28 years; subject to headaches. Maternal grandfather died of lung disease. Two twin brothers and one sister died of convulsions.

In the preceding case we attribute the rapid degeneration to the concurrence of alcoholism in both parents. In the following case alcoholism again appears in both parents. On one side it is transmitted fully from father to son, on the other side very incompletely, from father to daughter; the inherited degeneration has not affected all the progeny.

CASE XLV. (unedited).—Laumail., Gustave, age 9 years; imbecility; symptomatic epilepsy. Father, plumber; in good health; never had convulsions; gets drunk two or three times a week, or oftener, on wine; during these times he is violent and beats his children. Paternal grandfather æt. 74, very frequent excesses in strong drink. Mother very excitable. Maternal grandfather, excesses in strong drink; gets drunk once a week. Maternal grandmother, asthma. One brother, convulsions at dentition. Patient probably begotten during intoxication.

The following two cases show the effect upon the progeny of differing hereditary influences from both parents.

CASE XLVI. (Féré, neuropathic family).—V., age 15 years; hysterical. Maternal grandmother, delusions of persecution; died at the Salpêtrière. Mother hysterical; her two brothers are mentally unbalanced. Father alcoholist; has one brother insane at Bicêtre; delusions of persecutions. Another brother has had delirium tremens. Another brother very irascible; some delusions of persecution. Three sisters nervous; one of them subject to fits.

In this family, one brother and three sisters have inherited from the mother. Two brothers have inherited diadromically from the grandmother. One has inherited from the father; but his alcoholismic heredity is modified by the neuropathic

influence of the mother, and has developed delirium tremens, as in other instances noted above.

CASE XLVII. (unedited).—Hir., Lucien, age 17 years; hysteria. Has severe attacks; has occasionally manifested tendency to get drunk since age of 15; he took to it without extraneous temptation. Father nervous; convulsions during childhood; cephalalgia. Paternal grandfather, tædium vitæ. Paternal uncle, phthisis. Two paternal cousins died of meningitis. Mother, cephalalgia; very excitable. Maternal grandfather inveterate habitual alcoholist; "can never get drunk; he is like a hogshead." Maternal great-grandfather died young of paralysis following prolonged excesses in white wine.

In the above case it is not the mother, but the father, who contributes the neuropathic element. The dominant feature of the child's heredity is neuropathic; while alcoholism, transmitted diadromically from the maternal grandfather, appears with diminished intensity, at least for a time.

We have thus far considered the influence of heredity upon the individual; there remains for consideration the reaction of the individual under this inherited influence. This reaction is modified so frequently and so deeply by accidental circumstances, that it becomes often extremely difficult to discern how much depends upon fated hereditary causes, and how much upon occasional causes in the existence of the individual. We may conclude from what we have stated, that every alcoholismic is affected in his own way by the alcohol. In some, intoxication brings on delirium tremens, in some it develops general paralysis, in some it produces chronic alcoholism with somatic disorders. This question of personal reaction has been placed in a strong light by Lasègue and many other authors. Lasègue, while speaking of the propensity for fermented drinks, says that "without it alcoholism would be impossible." He continues thus: "There are, in relation to this matter, two classes of subjects, viz., those who are 'absolutely refractory' to alcoholism, and those who are 'absolutely sensitive' to alcoholism. The first group consists of strong robust subjects, who can at intervals imbibe very considerable quantities of alcohol, without appreciable damage to their health or reason. Among them it is not rare to meet profuse drink-

ers who are quite insusceptible to alcoholism; their tolerance is abnormal. The second group consists largely of small drinkers; they have not the necessary endurance to carry their modicum of wine. The stimulus, even in moderation, far from producing in them, as in the former group, a genial excitement of gayety and happiness, often engenders only gloom and despondency, while their comrades become expansive in friendly and cordial fellowship. Investigation will serve to classify most of this second group in one of the three following categories, viz.: 1st. Either they have a hereditary tendency to cerebral complications; or, 2d, they have some defect of conformation; or, 3d, they have become liable to cerebral complications by some preceding occurrence." Elsewhere Laségue says, "in every case of intoxication we must study two elements: the individual intoxicated, as to his susceptibility —and the poison ingested, as to its quantity and quality. Every man who alcoholizes himself is not an indiscriminate entity; each one carries a personal element; his individuality modifies the action of the toxic substance quite as much as the toxic substance modifies him."

Féré dwells upon the influence of personality and its importance in his essay on "Les Alcoholisables." We will refer to these hereafter. We have seen why Alcoholismics by heredity are alcoholists, and under what form they manifest themselves. We must now examine by what process they become so. But before analyzing the "mechanism," or rationale, by which they have been led to intoxicate themselves, we shall pass in review the second category of alcoholismics by heredity, namely, those in whom the alcoholism is due to heredity, not in similars, as we have heretofore considered it, in its ramifications, but to heredity in dissimilars, cases of which we have recorded in our statistics.

Heredity in Dissimilars.

We trust we have shown satisfactorily the very intimate relations which subsist between alcoholism and all the other hereditary manifestations belonging to the neuropathic group, among which latter Féré has demonstrated the closest relationship. But we have not dwelt upon this kinship because we wished to limit our attention, for the time being, exclusively to heredity in similars. We now take up the subject under a

broader and more general view, and consider whether we may not—whether we must not—class alcoholism among the great family of neuropathic diseases, in view of the frequency of its coexistence and intercurrence with other affections of this family, in both the ancestry and the progeny of alcohol victims. In reviewing the numerous nervous affections, whether psychical or organic, and sometimes both combined, as manifested in the families of alcohol victims, we are continually reminded of the frequency with which alcoholism figures as a predisposing cause. More especially does the alcoholism of the parents develop or intensify in their offspring such neuroses and psychoses as hysteria, and above all epilepsy, which is so frequent, and idiocy, perversion of instincts, moral insanity, the delirium of hereditary degeneracy, or convulsions, and a host of consecutive somatic disorders.

A cursory view of the families of drunkards will reveal all these affections coexisting, intermingling, supplementing each other, in the different members of one family. Of this we have already given instances. But we wish now particularly to emphasize the frequency with which we may observe alcoholism in such families, under the same provocation as any other psychopathy or neuropathy, and often in combination with such mental or nervous disease. This fact, most clearly evidenced by the vast majority of careful studies of alcohol victims, shows how close is the connection between alcoholism and neuropathy. We shall not pursue this pathological connection in its relation to descent or progeny any farther than we have already done.

We shall now try to show that this correlation between alcoholism and the psychopathies and the neuropathies, so evident in the descendants of alcoholic victims, is equally manifest in their procreators. In other words, we shall try to demonstrate that the various affections of the neuropathic group may, under favorable circumstances, cause alcoholism, as they would any other affection of their class.

This leads us to the consideration of heredity in dissimilars in the transmission of alcoholism. In this investigation we will follow the plan laid down by Féré, and consider first the relations of alcoholism with the psychopathic branch, and then the relations with the neuropathic branch properly so called.

CHAPTER V.

THE PSYCHOPATHIC FAMILY AND ALCOHOLISM.

ALCOHOLISM AND EPILEPSY.

AMONG the neuroses, the one which appears to bear most constant relations to alcoholism is epilepsy. The following cases will show these two morbid conditions intermixing and supplementing one another.

CASE XLVIII. (unedited).—Bree., age 10 years; hereditary epilepsy; begotten during drunkenness. Father, alcoholist, pederast; violent, epileptic. Paternal uncle, drunkard; nervous; has two children, both subject to convulsions. Paternal grandfather epileptic. Maternal grandmother cephalalgic. Maternal uncle criminal; convicted thief.

CASE XLIX. (unedited).—Heur., Auguste, age 12 years; hereditary epilepsy. Father, excesses in alcohol and venery. Paternal grandfather sober; excesses in venery. Paternal grandmother, insanity, epilepsy; died at Salpêtrière. One paternal uncle, excesses in strong drink. Another paternal uncle, fits of anger. One paternal aunt, epilepsy; she has borne an epileptic child. Two paternal cousins-german much given to venereal excesses.

We have shown that epilepsy in the procreators may generate alcoholism in the progeny; it is not less curious to observe that, under the influence of epilepsy, a latent alcoholismic may give himself over to strong drink.

CASE L. (unedited.)—Mong., François, wood-chopper in the forest, age 50 years; late developed epilepsy. Father, drunkard, killed by falling down-stairs; he had abandoned the mother of the patient with her three children, whom he acknowledged to be his own. Patient married at 25 years; his health had always been good; he was of average intelligence; it is not known that he ever had convulsions. His disposition

was gentle; he was never addicted to alcoholic or venereal excesses. A short time after marriage his wife noticed that about every month he was attacked by malaise, with nausea and vomiting of glairy mucus. At 31 years he had a sudden attack: he commenced by walking back and forth in the room, spitting out frothy mucus, and saying, "Here comes up mother; now she's under the bed!" and swinging his right arm around like a windmill, he seated himself on a chair, and suddenly fell to the floor like a log, without emitting a sound. His face and hands were blue and stiff. After remaining motionless for nearly an hour, he attempted to undress himself; he went to the window and tried to jump out, under pretext that he was not in his own house. This delirium lasted an hour. His second attack occurred about a week after the preceding; it was less violent. Subsequently such attacks continued to recur at intervals of about a week, then more frequently. From this time he commenced to drink; he committed no great excesses reaching to drunkenness, but he often came home excited under tipple; he drank wine only. These comparative excesses, in which he had never indulged before his sickness, were presumed to be the cause of the increased frequency of his attacks before entering the asylum.

In the following case the reaction between alcoholism and epilepsy is equally manifest; but information concerning the heredity runs back only to the next preceding generation, and is vague. It cannot, however, be reasonably doubted, in view of noticeable symptoms in the collateral branches of the family, that neuropathic heredity existed.

CASE LI. (unedited).—Mott., age 59 years; epilepsy, absinthism. Father died at 81 years of strangulated hernia; cabinet-maker by trade; sober in habits; violent in temper; no nervous disease. Patient had three brothers; one of these died of dropsy; was violent in temper; had convulsions in childhood. The other brothers are in good health. Sister is blind for some years; nervous; rheumatic, with resultant deformity. The father and mother were cousins-german. Patient married at 32 years; cabinet-maker, good workman, and sober in habits at date of marriage. At 36 years he saw an old man fall down in the street and have his head severed by the wheel of a vehicle that ran over him. This sight immediately

brought on his first epileptic fit; he had no fixed pains in the head, no headaches; no giddiness or nightmares. His second attack occurred a week after the first. For nearly three years the attacks recurred at nearly weekly intervals. In time they became more frequent, recurring once or twice a day, and sometimes five or six times, as a maximum, in twenty-four hours. The longest interval between fits seldom reached two days; the attacks came on during either day or night. After his 38th year he became addicted to alcoholic excesses; he drank a great deal of absinthe, and even spirits of wine. He got drunk three or four times a day; he was violent; he drove his wife out of bed and beat her. He drank about half a pint of absinthe at a bout; sometimes twice as much.

The complication of epilepsy with alcoholism is of frequent occurrence; several instances are given in our statistics. Alcoholism by heredity sometimes manifests itself before the development of epilepsy, as in the following case.

CASE LII. (Doursoult).—H., habitual drunkard since childhood (on cider and brandy); subsequently he becomes epileptic; has an attack of lypemania with tendency to murder and incendiarism. Father alcoholic.

We may see in one family one descendant develop alcoholism and insanity, another epilepsy, a third alcoholism alone.

CASE LIII. (Doursout.)—Woman, age 18 years; epilepsy, rickets, mental instability, perverted instincts. Two sisters and one brother are epileptic. One brother is a habitual drunkard. One sister is in tolerably fair health. Father and mother are alcoholists.

This case shows us, moreover, how a double heredity from both parents leads rapidly to deep degeneration, and how alcoholism may show itself on the same footing as a degeneration.

In the following case we see alcoholism, by heredity in dissimilars, associated in the same family with epilepsy and insanity.

CASE LIV. (unedited).—Givet., epilepsy. Father, alcoholist; died of apoplexy. Paternal uncle, epilepsy. Another

paternal uncle, insanity. Paternal grandmother, paralysis. Paternal grand-uncle committed suicide.

What we have already said concerning epilepsy may be repeated as to hysteria, with this limitation, that hysteria and alcoholism by heredity alternate less frequently in transmission. We have, however, an instance of this in Case XLVI. quoted from Féré.

Alcoholism and Hysteria.

We have no recorded cases in which hysteria is the only neuropathic taint of the progenitors. This is readily explained, hysteria itself being only one manifestation of neuropathic heredity. We have above seen it associated with alcoholism and insanity, giving rise to alcoholism and epilepsy. In the following case hysteria, associated with insanity only, causes, in the progeny, epilepsy and alcoholism. Neuropathic heredity is thus shown to predispose to alcoholism in the offspring.

Case LV. (unedited). — Desp., age 15 years; epilepsy. Father, alcoholist; epileptic from the age of 9 to 22; one paternal uncle phthisical. Two paternal uncles committed suicide. Paternal grandfather phthisical. Paternal grandmother hysterical, immoral. Paternal grand-aunt insane.

As in the case of epilepsy, so may alcoholism in the progenitors produce, in the offspring, hysteria combined with alcoholism.

Case LVI. (unedited).—Lep., age 46 years; washerwoman and janitress. At 38 years, during latter portion of pregnancy, she had hemiplegia of left side which lasted three months, and disappeared suddenly six weeks after child-birth; it was of hysterical origin. Brother, drunkard. Father phthisical; died æt. 57; indulged to excess in wine only. Cousin (female) subject to nervous fits. Cousin (male) died of convulsions. Five children died of convulsions. Nothing noteworthy on mother's side.

Alcoholism and the Vesaniæ.

The vesaniæ (Cullen, in his Nosology, applies this term to diseases in which the judgment is impaired, without coma or

pyrexia), properly so-called, are met with in the progenitors of alcoholismics, and cases occur where this cause alone produces alcoholism in the offspring. This becomes evident when alcoholism manifests itself alongside of various degenerations, other insanities, and neuroses among the offspring of one family. In such a case it must reasonably be attributed to the hereditary influence.

CASE LVII. (unedited). — Heur., age 12 years; complete idiocy. Father sober. Paternal uncle died at 7½ years of Pott's disease. Paternal aunt died at 2½ years of convulsions. Paternal grandmother very excitable; religious monomania at 67 years. Paternal grand-uncle commenced to drink hard late in life; died after drinking a quart of brandy at one bout. Paternal great-grandmother was temporarily insane and had to be placed under restraint.

CASE LVIII. (unedited). — Brouck., age 16 years; idiocy, epilepsy. Begotten during drunkenness of the father. Father æt. 42, married at 26, when he was already a hard drinker; after this he increased his potations of wine, beer, brandy, but used no absinthe. After the birth of patient he drank still more, and came home drunk three or four times a week. His wife left him because of his drunkenness and abuse. Paternal uncle, frequent excesses of strong drink. Paternal grandfather in robust health; frequent excesses of strong drink. Paternal grandmother does not drink, but is very excitable. Paternal grand-uncle (brother of the grandmother), excesses of strong drink. Another grand-uncle, brother of the preceding, nothing notable. Paternal grand-aunt (sister to grandmother) died insane; her son is "cranky," but able to attend to his business. Paternal grand-aunt (another sister to grandmother) died in childhood; had been demented five years.

We see here in one family of five brothers and sisters, one very excitable, one insane, one demented, one alcoholismic, and one who appears to be free from morbid taint. One of the sisters married an alcoholist, and their two sons became inveterate drunkards. Here the alcoholism appears to be clearly chargeable to the neuropathic heredity prevailing among the brothers and sisters. And, furthermore, we may attribute to this heredity the virulence with which the transmitted alcoholism (this time in similars) manifests itself in one of the

two sons, issue of the marriage of one of the sisters with an alcoholist. We may also often observe mental alienation co-operating or intermingling with somatic nervous affections to develop alcoholism.

CASE LIX. (unedited). — Fevr., Paul, age 20 years; imbecility. Father, æt. 45, cooper; he worked on containers of alcohol and absinthe; has long committed excesses in strong drink; "he has fallen into a beastly condition; he is no longer fit for work; nobody will employ him." Married at 20, he was already a hard drinker; his employer informed his wife on the wedding night that her husband tippled in secret; some days after marriage she noticed that he had drunk too much —wine only; later on, while employed in the storage vaults, at the Entrepôt, he took to drinking spirits and absinthe; during last fifteen years his intelligence has gradually deteriorated; shiftless and careless, he neglects his affairs and his family; is much addicted to venery; during the last year he has had two attacks of paralysis. Paternal grandfather died of congestion of the brain; paralysis of left side; was not addicted to drink. Paternal grandmother, frequent excesses of brandy; is at present insane. Great-grandfather (father of last-named) died of cancer of the stomach. Great grandmother (mother of the grandmother) died in dementia. Paternal uncle insane. Paternal aunt died in dementia. One sister died at 15 months of meningitis. Another sister under restraint in House of Correction.

In the following case we see alcoholism transmitted diadromically, passing over one generation to the succeeding one, and also extending collaterally. Furthermore, in the parentage on each side, there is traceable, in addition to the alcoholism, a neuropathic and vesanic heredity. Thus we see, notwithstanding the comparative remoteness of the alcoholismic heredity, inherited alcoholism manifest itself precociously in association with epilepsy.

CASE LX. (unedited).—Long., Paul, age 24 years; symptomatic epilepsy, alcoholism. Convulsions; first attack consequent upon a fright, caused by monkeys (?); subsequently the attacks recurred at intervals till age of 12; the first attack of epilepsy occurred six months after a typhoid fever at

12 years; at 16 years he commenced to drink freely wine, brandy, vat-lees, absinthe; he smoked and chewed tobacco; between 16 and 20 his excesses did not extend to complete drunkenness; after 20 got drunk several times a month; he drank all the money he earned at his father's; he had inherited four thousand francs from his mother, and had spent them before reaching his twenty-second year; onanism between 12 and 13 years; was not addicted to women. Father, nothing noteworthy. Paternal grandfather separated from his wife; for thirty years he served as soldier; frequent alcoholic excesses. Paternal uncle died insane. Cousin-german, nervous attacks (hysteria?). Mother, headaches; died of pericarditis; was insane eight or ten months after typhoid fever. Maternal uncle, absinthe drunkard; committed suicide after having drunk a large quantity of absinthe. Seven brothers or sisters died in childhood without convulsions.

Alcoholism and Mental Degeneration.

The alcoholism, which we meet so frequently in degenerates, is often traceable to the mental peculiarities of the progenitors; although there may be no trace of alcoholism among them.

Case LXI. (Legrain).—Man of about 30 years. He is a hereditary degenerate; for several years he has indulged in enormous excesses of absinthe; he has reached the lowest stage of brutish bestiality, after passing through successive gradations of vertigo and convulsions of toxic origin. Mother, æt. 56, is weak in body and mind, loquacious; had convulsions in childhood. Father, æt. 70, was in his fiftieth year when patient was born; of limited intelligence and void of energy. One maternal grand-uncle most sordid miser; although rich, he dressed in rags and concealed his money; he died in a private insane asylum. A son of the last named (who is also cousin-german to the mother) is as unbalanced and as miserly as was his father; he also is in an insane asylum. Three brothers or sisters died in childhood of convulsions.

Case LXII. (Legrain). — Jean., age 21 years. Weak in mind and body; physical evidences of degeneration; very marked inequality between the two sides of his face; he had typhoid fever at 12 years; he was admitted to St. Anne's Asy-

lum after some heavy excesses in drink, having melancholia, discouragement, imaginary terrors, alternations of excitement and depression. Later on he was again admitted. In the interval since first discharge from hospital he had found employment in a wholesale wine house; here he found opportunity to contract drinking habits; melancholic depression again supervened, interrupted by periods of excitement. He refused food; was in fear of being poisoned; mystical hallucinations; vagaries, fears of persecution; at times he was dumb; he committed assault and battery upon his mother; made threats of murder. Father quick, irascible, of light morality, odd ideas, argumentative, paradoxical. Paternal grandmother died at 25 years, after a short illness, with predominant cerebral symptoms. Maternal grandfather died suddenly at 58 years. One paternal cousin-german (female), profound melancholia; she was cared for at home as insane; mental debility. One cousin-german (male), weak in body and mind; apathetic; incapable of self-guidance. Brother, age 18 years, turbulent, irascible disposition much resembling his father's.

Alcoholism and Suicide.

Among morbid hereditary affections few are more conspicuously so than the predisposition to suicide. Ribot says: "Nowhere does morbid heredity manifest itself with such invariable uniformity; suicidal mania of the progenitors repeats itself in the progeny, at nearly the same age and by similar processes; the repetition is essentially faithful, even in details." If it be admitted as proven that the predisposition to suicide is hereditary in at least a large number of cases, it is equally certain that alcoholists furnish the largest contingent to the list of suicides. "Suicide," says Lasègue, "is one of the elements of alcoholism, and transposing the elements of the proposition, we may with equal truth say that alcoholism is one of the elements of suicide." He distinguishes two forms of suicide—the one deliberate, predetermined, reasoned out; the other impulsive. He classes the suicide of alcoholists as impulsive. According to him, cerebral derangement, whether or not resulting from intoxication, is the general exciting cause of suicide, and the large majority of persons who commit suicide are profoundly silly.

Paul Moreau, of Tours, in his article on suicide, in the Jaccoud Dictionary, thinks that a careful examination of facts will justify the conclusion that the number of perfectly sane individuals who commit suicide is very much smaller than is generally thought. In his category of "perfectly sane individuals," he includes all who can form a calm, logical judgment and deduction, from divers motives, such as misfortune, deep grief, fear of disgrace, etc., and he considers that among the victims of suicide will be found very many who are or have been of insane mind, during a greater or less period of time—neurotics, alcoholists, and alcoholismics, or persons laboring under the demoralizing oppression of intolerable suffering, and also such as are burdened with hereditary predisposition or eccentricities. In short, almost all cases of suicide occur in subjects who are ill balanced in mind; and we might say of suicide, as Lasègue says of alcoholism: there are subjects who are refractory to it, and others who are sensitive to it. We consider the tendency to suicide to be a mental disease, most frequently of hereditary origin, and that, properly, it should be included in the neuropathic class. Its relations with alcoholism are manifested by the tendency to suicide evinced by all classes of alcohol victims, whether dipsomaniacs or alcoholists. This interdependence will appear in stronger light when we observe the reverse, and see suicidal mania in the progenitors, without alcoholism, engender alcoholism in the offspring. The following observation gives an instance:

CASE LXIII. (unedited). — Stoff., Jacques, age 6 years, complete idiocy. Father, æt. 34; clerk, queer; very selfish; before marriage he was addicted to occasional excesses in drink; after marriage continued these at intervals of about one month; he was a regular frequenter, in the evenings, at liquor saloons; his wife generally accompanied him, and he drank principally beer, brandy rarely, absinthe never; at one time bitters were his favorite tipple; the general state of his mind is gloomy, under liquor he is gay; he is not malicious or "ugly" in disposition. Paternal grandfather queer, like his son; he cut his throat with a razor on account of money losses; he did not drink; he earned ten thousand francs a year salary, yet he allowed his wife to be a box-opener at one of the theatres; he made her, in a general way, very unhappy.

Paternal uncle, a confirmed drunkard; abandoned his family; he was a student of medicine, subsequently a jeweller; he has one son who has an enormous head and a diminutive body; in childhood he could not walk for top heaviness; this son has grown to be an intelligent man and is treasurer to a Lyceum.

Here we can trace no cause for the alcoholism of the two brothers (father and uncle) except the queerness and suicidal mania of their father (grandfather to our patient).

In the following case the suicidal mania of the progenitor (paternal great-grandmother) has engendered alcoholism in the progeny of first generation from her (paternal grandfather); and this alcoholism has been transmitted, by heredity in similars, to the next generation.

CASE LXIV. (unedited).—Pins., age 17 years; cerebral atrophy, hemiplegia of right side, athetosis. Father, locksmith, died at 45 of lung disease; married at 24; excesses in drink (wine and brandy); at 25, after birth of patient, he took to drinking absinthe; smoked much tobacco; not much addicted to venery. Paternal uncle, periodical excesses in strong drink. Paternal aunt, nervous fits at 15 years. Paternal grandfather, frequent excesses in strong drink. Paternal grandmother, cross tempered, peevish, slight nervous fits. Paternal great-grandmother committed suicide. Paternal grand-aunt (sister of the grandmother) had a cerebral affection at 22 years, during which she became contradictory and melancholic.

In the following case a light degree of alcoholism in the father, conjoined to a suicidal tendency aroused by previous excesses in drink, has sufficed to develop in the offspring—alcoholism in one, suicidal mania in a second, a nervous disease in a third, and abnormal nervous susceptibility in them all. Alcoholism, in this case, holds its rank among the neuropathic diseases.

CASE LXV. (unedited).—Vois., age 19 years; congenital idiocy. Asphyxia at birth, the umbilical cord being coiled around the child's neck. Father, æt. 35 (must have been 16 years old at birth of this patient), turner in copper; has had several attacks of copper colic; articular rheumatism; ex-

cesses in strong drink which affects him easily; nervous, irascible, violent, especially under influence of liquor; had convulsions in childhood. Paternal grandfather died of congestion of the brain at 52; occasional excesses in drink; when in liquor he always wished to kill himself; on many occasions he wrote to his wife, warning her of the immediate execution of such intentions. Great-grandfather (father of the last-named), senile dementia. Four paternal uncles all nervously excitable; the youngest had many convulsions during childhood; another died of apoplexy; another tried several times to asphyxiate himself with charcoal fumes.

We call attention to the distribution of the father's heredity among his several progeny—to one he imparts the cerebral apoplexy, which kills him, as it did his father before him; to another he bequeaths his predilection for alcohol, giving to it additional emphasis; to a third he transmits his tendency to suicide, at which he makes repeated attempts. We have had occasion several times to call attention to this phenomenon; its importance justifies insistence upon its recognition.

It would appear that alcoholists, born from alcoholists who have attempted suicide, are thereby predisposed to end their lives after the same fashion. We have already seen an instance of this in Case XXIII., with this peculiarity, that the alcoholismic who hung himself had inherited the proneness to drink directly from his father; while the predisposition to suicide reached him diadromically from his grandfather. The two tendencies concurred in the same individual, who was otherwise remarkably prepared for this coalescence. It is worthy of note that even the form of suicide was hereditary.

In the following case we again note the two predispositions concurring in the same individual. It is interesting to notice how heredity appears to break up and scatter among the progeny the accumulation of tendencies which had gathered in a single progenitor. On the other hand, we see heredity concentrate into a single individual the divers propensities of many ancestors.

CASE LXVI. (unedited).—Monneh., Emile, age 15 years; convulsions in childhood, epilepsy, imbecility, asphyxia at birth. Nothing noteworthy on the father's side. Mother,

æt. 46, sempstress; well-behaved until age of 28 years, when she commenced to drink wine and arquebusade to steady her nerves; a little of this latter sufficed to excite her; she frequently stole money from her husband to buy drink and sold his effects to get wine; three times she ran away from home; the first time she staid away for a month and a half; the second time, for two months; the third time she never returned to her household. She was imprisoned for three months for stealing. She was very nervous, irascible, and violent in anger; subject to nervous fits after drinking; made several attempts at suicide; she tried to strangle herself with a handkerchief and threatened to drown herself; her intellect was about the average. Maternal grandfather died of apoplexy after an excessive drinking bout. Maternal grandmother tried to drown herself. Materal grand-aunt drowned herself. Maternal uncle, habitual drunkard.

We have said above that alcoholists begotten by alcoholists who have attempted suicide are, by heredity, predisposed to end their own lives after the same fashion; as confirmatory of this we refer to Case V., a woman of 38 years, born from an alcoholist father, who committed suicide. She took to drinking gin at 19 or 20 years; developed symptoms of chronic alcoholism, and finally attempted suicide as did her father before her.

We note, morever, that the tendency to suicide appears to have produced no effect on the descendants in the first generation; but it has acted diadromically through them, with grave neuropathic heredity, upon the second generation, developing among them two alcoholists, one of whom commits suicide, one paralytic, etc. The case is additionally interesting by showing the heredity of alcoholism on both sides of the family—on the mother's side, in similars, and on the father's side, in dissimilars.

Case LXVII. (unedited).—Dup., Jules, age 11 years; congenital imbecility; begotten between two drunks. Father, slate roofer, died at 36 years by an accident; frequent excesses in strong drinks, particularly wine; got drunk about once a week, generally on Saturdays, sometimes on Mondays besides; not violent; good workman; not addicted to women; had convulsions in childhood; violent fits of anger in youth,

during which he fell down rigid; never could learn to read; was arrested several times for insulting soldiers and policemen; at one time, while drunk, he stabbed himself in the breast, about one inch below the left nipple. Paternal grandfather died at 75 years of retention of urine. Paternal great-grandfather twice attempted to poison himself on account of quarrels with his daughter. One maternal uncle died of alcoholic excesses. Another paternal uncle died of left hemiplegia. Other paternal uncles died young. Mother, æt. 35, sempstress; fainting fits during pregnancy; headaches with phosphenes. Maternal grandfather died at 33 years of grief at his wife's misbehavior and drunkenness. Maternal grandmother died at 55 years, "burnt out by drink"; she had been unconscious and paralyzed for forty-eight hours before death. One maternal uncle enlisted and disappeared. Another maternal uncle is in good health; had several children who died a few days after birth. Maternal aunt is a toper and prostitute.

Hence we may reasonably conclude that the tendency to suicide manifested in the progenitors may be reproduced in hereditary alcoholismics; and, furthermore, that the proneness to suicide, of itself, in the parents, constitutes a sufficient heritable taint to develop, by metamorphosis, a predisposition to the use of strong drink in the offspring. If alcoholism behaves toward suicidal mania as it does toward any other hereditary nervous affection, then this suicidal mania may, in turn, produce, by hereditary transformation, alcoholism in the progeny, as it would any other psychic degeneration. We therefore conclude that both suicidal mania and alcoholism by heredity should properly be added to the already very long list of neuropathic diseases. Or, more specifically, they should receive separate consideration, as morbid conditions belonging unmistakably to the domain of mental alienation.

Alcoholism and Licentiousness.

We may now advance still farther, and pass on from manifestly pathological mental conditions to other psychical conditions which may be characterized as abnormal and peculiar to vicious and criminal subjects. It is but one step from these to instinctive insanity, moral insanity; the close analogy between them has attracted the attention of many authors; the

kinship of vice and insanity has been averred and admitted. Despine has reported many remarkable examples of it, and Maudsley considers it to be beyond controversy. We entirely agree with Féré: "Vice, crime, and insanity are separated only by social prejudices; they are all united by their common trait of fatality, all of them predestined. If we do not overcome our repugnance to recognizing this intimate relationship, it is not for want of scientific proofs of its existence; but it is for fear of the practical consequences which devolve from it and which at once present themselves to the reasoning mind."

We must, therefore, not be surprised to see vice, debauchery, all the moral perversions which figure upon the very brink of insanity, properly so called, and which so often lead to it, act absolutely in the same manner as the other psychopathies, and transmitted from parents to offspring in whom they favor the evolution of alcoholism. In such cases, habitual drunkenness does not appear as a direct result, but, in most cases, indirectly from the weak and debased intellectual and moral level of those who yield to it. We offer a few cases in point.

Lucas reports the case of a father, a son, and a grandson, all the males of a family, carried off each in the prime of life, by most shameless drunkenness and unrestrained licentiousness. We have ourselves noticed, in hereditary alcoholismics, the concurrence of venereal and alcoholic excesses. We select the following cases as characteristic.

CASE LXVIII. (Grenier). — Thu., Amab., age 20 years; imbecility; microcephalus; convulsions during childhood. Mother debauched; very nervous; excesses in strong drink, principally absinthe. Maternal uncle, alcoholist. Several maternal relatives, uneducated, alcoholists. Two brothers died young in convulsions. One brother, hard drinker.

CASE LXIX. (Grenier). — Duc., Eugene, age 18 years; convulsions up to age 3 years; commenced to walk at 20 months; late in learning to speak; he lisps; violent anger; imbecility; facial asymmetry; prognathism. Paternal grandfather, loose behavior; excesses in strong drink. Father, drunkard on absinthe; got "dead drunk" every day; he was shot during the "Commune." Paternal uncle, hard drinker, a proven pederast; committed suicide at 28 years.

CASE LXX. (unedited).—Charr., Charles, age 4 years; idiocy, deafness. Father, ditcher, low intellect; very nervous and irascible; very frequent excesses of strong drink; spends all his earnings for liquor; excesses of venery; neglects his wife and children; excessive use of tobacco. Paternal grandfather, æt. 56, vicious, irascible, nervous, unintelligent; worse than the son; often gets drunk; venereal excesses in youth; excessive use of tobacco. Paternal grandmother, æt. 52, subject of much scandal; as a young girl she bore a child to a married man; after her marriage she behaved badly; seven years ago she had a lover, within sight and knowledge of her daughter-in-law. Paternal aunt, prostitute among the soldiers at Versailles. Four paternal uncles died in convulsions. Another paternal aunt immoral at 22 years; has borne four children; lives in marital relations but is not married. Great grandfather (father of the grandfather) was a great debauchee, but lived to the age of 84 years. Paternal grand-uncle, wine merchant, was a great reveller; alcoholic and venereal excesses. Two cousins-german (female) of the father live in marital relations without marriage; one of them has been associated with two men. Mother nervous. Maternal grandfather was vicious, a hard drinker, and addicted to women; he disappeared after the war with Prussia. Two brothers died of convulsions.

CASE LXXI. (unedited).—Gaut., Alfred; complete idiocy, depravity, convulsions. Father, æt. 50, laborer, formerly cabinet-maker; chronic bronchitis for six years; between 17 and 36 years he drank freely, mostly wine; very little of stronger drink; often tipsy; at such times wicked and jealous, abusive to his wife; between 36 and 46 years drunk two or three times a week; nervous spasms; fits of anger; much addicted to venery. Paternal grandfather killed by accident at 48 years; great toper; very violent; very wicked; much addicted to women. Paternal grandmother died of cholera; very nervous, but not subject to fits. Paternal aunt, sempstress, æt. 43, very nervous; frequent headaches. Two paternal uncles died while yet young. Mother, attacks of vertigo before puberty. Mother and father are cousins-german. Maternal grandfather died of paralysis at 46 years. One sister died of meningitis. Patient was begotten probably during drunkenness of the father.

CASE LXXII. (unedited). — Garg., age 20 years; idiocy. Father, æt. 47, butcher; frequent excesses in drinking, generally brandy, sometimes absinthe; drunk almost every day; at such times very violent, breaking everything within his reach, and beating his wife; married at 19 years, he had already commenced hard drinking; gradually increased his excesses; at 28 or 29 years he commenced to have fainting fits, followed by heavy sleep with stertorous breathing; these attacks always came on while he was drunk. Paternal grandfather died at an advanced age; was a debauchee; gave rise to much scandal; was not a drunkard. Paternal grandmother, great toper; died above 60 years old, cause of death unknown; she was always drunk, debauched, and a bad mother; though never married, she bore fourteen children, whom she placed in the foundling asylum, and concerning whom no details have been learned. Nothing noteworthy on the mother's side.

CASE XLIX. (reported above) is interesting. Among the progenitors of the hereditary alcoholismics, therein considered, the only taints are neuropathies and venereal excesses, both of which are transmitted to the progeny, distributing themselves among these.

We may also notice precocious, perverted sexual desire as a consequence of and coinciding with hereditary alcoholism. In the following example we unfortunately have absolutely no information concerning the father. But this very lack of information shows us that the morality of the mother was far from irreproachable, and that of the father probably little or no better.

CASE LXXIII. (unedited).—Muls., age 18 years; epilepsy, convulsions at 4 years, vertigo at 13 years. First fit of epilepsy at 15 years; onanism; depraved instincts; at 17 years, attempted rape on little girls from 8 to 12 years of age; had also made an attempt upon his little sister; his stepfather had seen him tipsy, but never completely drunk; quarrelsome with his stepmother (after his mother's death, his stepfather had married again); he drank principally wine, occasionally absinthe; earned small amounts by running errands, and spent all his earnings in drink; his epileptic fits increased in frequency when he drank. Father unknown, the child being illegitimate. Mother married at 34 years; had commenced to drink freely

at 33 years. Before marriage she promised to cease drinking; and actually remained sober for one year; then she recommenced and increased her excesses more and more. She died of lung disease, six or seven months after her last child-birth. She drank deeply to the last.

Although our present field of observation includes only the taints of ancestry, we here add one case to show hereditary alcoholism may propagate debauchery alone, or at least may develop it in advance of other psychopathies; and also to demonstrate the intimate connection which exists between alcoholism and debauchery in their relations to heredity.

CASE. LXXIV. (Doursout).—Woman, age 25 years. Intelligence little developed. Debauched but not given to alcoholic excesses. The grandmother, the mother, and one aunt on mother's side are confirmed drunkards.

CHAPTER VI.

THE NEUROPATHIC FAMILY AND ALCOHOLISM.

To complete our review of alcoholism by transformed heredity, that is, by what we have called "heredity in dissimilars," it remains for us to treat of those cases where the tendency to drink appears to result solely from the neuropathic condition created by nervous affections, properly so called, occurring in the ancestry, whether direct or in collateral branches. Cerebral hemorrhage, apoplexy, paralysis partial or general, play the principal part. These affections, however, manifest themselves often in combination with other nervous taints in the same family.

CASE LXXV. (unedited).—Sim., Marino, age 16 years; mental instability, perversion of instincts, kleptomania, pyromania, onanism. Commenced sexual indulgence at 12 years; somnambulism; fits of anger at 14 years; while in Africa, he often got drunk on absinthe; drank essence of mint, anisette, and a great deal of coffee. Father died at 78 years of apoplexy; sober in his habits; before marriage he committed onanism, from fear of venereal disease by sexual indulgence; he continued onanism after his marriage; at 57 years he attempted suicide. Mother, æt. 56, sempstress; subject to headaches; giddiness between 32 and 37 years; very nervous; weeping spells. Maternal grandfather sober in habits; died at 73 years of apoplexy. Maternal grandmother died of sudden fright. Maternal aunt died at 16 years; painful amenorrhœa.

In the following case we see alcoholism and dementia in the father produce alcoholism in one son, insanity in another. Moreover, in this case, hereditary alcoholism has evolved morbid cerebral manifestations. This case may therefore be grouped with the others cited, as showing the influence which a pre-existing psychopathic state may exert in causing alcoholism to evolve a similar psychopathy and in implanting a

predisposition for alcoholic delirium as well as other morbid cerebral manifestations in alcoholists by heredity.

CASE LXXVI. (unedited).—Estiv., age 7 years; asphyxia at birth, hydrocephalus, symptomatic idiocy. Father died at 85 years from alcoholic insanity; the delirium tremens supervened upon an injury of the arm caused by a fall while drunk; he was a superannuated sergeant in the army, acting as sutler at the barracks; frequent excesses in all sorts of drink for ten years; sometimes he was drunk in the morning; lay down, slept it off, and got drunk again in the evening; about three years before his death he had an attack of insanity, with hallucinations, which lasted ten days; married at 34 years, when he was in the habit of drinking freely, but seldom got drunk. Paternal grandfather sober in habits, died of hemiplegia, was in second childhood at time of death. Paternal uncle died insane; excessive use of tobacco.

We have seen alcoholism combine with the neuropathies, vesaniæ, suicide, debauchery; we may also observe similar relations with the organic nervous affections.

CASE LXXVII. (unedited).—Jo., Leon, age 5 years; congenital idiocy. Father, brush-maker, died at 54 years of phthisis; facial neuralgia; irascible; during the first two or three years of married life, excesses in drink which subsequently were rare; sober after 27 or 28 years. Paternal grandfather died at 74 years; addicted to strong drink in his youth, more so than his son; very dangerous when angry; cause of death unknown. Paternal grandmother died of cancer of the pylorus. Two paternal aunts died of meningitis, one at 4 years, the other at 14 months. One paternal aunt died at 7 years; she had never walked; was paralyzed in both legs and arms. Mother, headaches and vomiting monthly for three days before menstruation, occasionally also at other periods. Maternal grandfather died at 64 years after three years' sickness; had paralysis of the extremities and of the tongue. Maternal grandmother died at 69 years of dropsy; frequent excesses in strong drink, even when she was young; when drunk she ill-treated her children. Great-grandmother (mother of the last named) died at 97 years, in second childhood. Two maternal uncles died of phthisis. Three maternal aunts died

young, cause of death unknown. One maternal aunt died at 32 years of uterine tumor. Brother of mother, age 30 years, had no convulsions in childhood; frequent excesses in strong drink. Another brother of mother died at 15 months of meningitis with convulsions. Sister died at 2 years of jaundice; had convulsions before death. Three brothers died of meningitis with convulsions at 7½ months, 9 months, and 11 months respectively. One brother, convulsions at 14 months, very violent in anger, sober in habit; age 20 years; he has been detected in shop-lifting; works occasionally, but is generally a vagrant.

CASE LXXVIII. (unedited).—Terr., Albert, age 17 years; imbecility, infantile paralysis. Mother chronic coryza. Maternal grandfather, frequent excesses in strong drink; died in a fit of apoplexy in 1881; previously had had a fit in 1875. Cousin-german of the mother, idiot; had convulsions in childhood; died at 17 years. Maternal grand-aunt morose, melancholic, epileptic; religious monomania, died by falling from a fifth story window, perhaps intentionally or accidentally, in an epileptic fit. Paternal great-grandfather died of apoplexy. Paternal great-grandmother, toper; died in her prime. Father, excesses in strong drink and with women; very violent when in his cups; dazed, otherwise he bore his drink very well; at about 37 years, nervous fits, in which he lost consciousness, turned black in the face, and seemed about to suffocate.

Other affections of the neuropathic family may likewise be met with. There is one case where asthma was associated with alcoholism in the parents, and out of seven descendants six are alcoholismic and one died of apoplexy.

CASE LXXIX. (Gendron.) — Percot., age 43 years, female, green-grocer, unmarried. Father, alcoholist; died at 60 years of pneumonia. Mother died of asthma at 64 years. Patient is the only survivor of seven children. One of these died of apoplexy at 41 years. One died of tuberculosis; he was a heavy drinker, as were also the other four, who died young. Patient has recently had attacks of epilepsy; she commenced using strong drink at 12 years; she has been admitted several times to St. Anthony and to the Salpêtrière.

In many cases, too, we find rheumatism and arthritis,

who are closely related to the neuropathic family, intermingling with alcoholism; but, as with the organic nervous affections, we have not yet met them as sole causes of alcoholism.

We consider it unnecessary to formulate any conclusions from the preceding facts; they are self-evident, and alongside of alcoholism by "heredity in similars"—which is the most frequent and characteristic—we must place alcoholism, "by heredity in dissimilars

The Development of Alcoholism in the Individual.

We have said above that the development of this inherited diathesis may be obstructed or hindered on the one hand, or may be favored and promoted on the other, by the individual soil upon which it is brought to bear. This personal soil is liable to the most extensive modifications under a multitude of influences and a variety of circumstances, which are often independent of the subject himself, which it is impossible to foresee, and which drive him fatedly into one channel, rather than into another. A similar course of events happens, however, in all hereditary affections; there is, therefore, nothing astonishing in its occurrence in the case of alcoholism. Furthermore, it is rational to conclude that the offspring of alcoholists will have a greater proneness to become such themselves on the slightest provocation, than if there were behind them some other form of neuropathic heredity.

The numerous and diverse influences which retard or promote the development of inherited predisposition are alike active in both the forms of this heredity. We have, on this account, delayed the study of these modifying causes, until we had shown the functions and the limitations of both these forms of heredity, that in similars and that in dissimilars.

We shall now try to identify these modifying influences and analyze their relative importance; although we cannot but realize, in advance, how inevitably incomplete and hence unsatisfactory must be the outcome of our task. It is the social bearing of alcoholism that we now approach; it is replete with interesting facts and problems; and it is irrepressibly suggestive of reflections, most saddening in their present aspect and most discouraging in contemplation of the future. The discussion and analysis of this question are most complex,

delicate, and difficult to conduct. In order to give some clearness and method to this study of social psychology, we will classify the subjects whom we study, into categories and groups. This method, although artificial, is yet the only one which permits us to advance steadily and readily to practical conclusions.

We shall examine first the great general influences, such as social surroundings, sex, and the modifications of national life. We shall then follow the child from its birth to the grave, seeking out the conditions determining alcoholism at the different periods of existence. But we must never lose sight of the fact that we are dealing with victims of heredity, inordinately sensitive to impulse, weak subjects whose nervous equilibrium is very unstable, as a consequence of their heredity, and whose mental balance may be easily upset in proportion to the intensity of the taint.

General Influences.

It cannot be doubted that alcoholists are recruited principally from among the working class; at all events this class comes most frequently under medical cognizance. We do not doubt, however, that a number, nearly as great proportionally, may be found among the unemployed of the higher classes, who pass their time in club houses, pool rooms, evening saloons, all-night resorts, and the race-course. Unfortunately, these escape general notice, and, hence, statistical enumeration. Moreover, sensible men with intellect above the average, whose blood has become impoverished by consanguineous marriages among bearers of titles or names, who are born solely for enjoyment and pleasure, lazy and prodigal, and thus debased or deficient in sense of moral responsibility, are dragged or driven to this besetting sin by fondness for good living and all physical enjoyments. But indulgence in these and in other vices among this class often remains successfully concealed. It is not, therefore, in such a class that we would expect to secure suitable subjects for our study; if secured, their usefulness would be impaired, most probably, by complication with other taints, for such, alas! are not infrequent among those whom we habitually call, by courtesy, the aristocracy, high life. Exhausted and never regenerated,

incapacitated for physical or intellectual effort, this group of society is doomed to extinction. But we cannot look with indifference upon the self-destruction of the active and reproducing element of our social life, the new and rising men, destined to replace the effete material and impart vigor and promise to the nation. We appeal earnestly for humane co-operation by the most active measures of public and private energy, to prevent their giving themselves up to premature extinction, and entailing upon their offspring, by their unconsidered course, deterioration and infecundity, debarring them inevitably from attaining the higher level of intellect and achievement to which the race has already advanced. Of all known deleterious agents none is more wide-spread, or more prolific, than alcoholism in producing this degradation of humanity; and it acts not only on the subject himself but also on his descendants.

Alcoholism by heredity, which we have heretofore endeavored to affiliate with the other affections of the neuropathic family, diverges from them completely in its relations to the intellect. While the neuropathic affections, in general, are in some way correlated with intellectual activity (as has been ably set forth by Moreau, and more recently by Jacoby and others), alcoholism advances side by side with intellectual debasement, mental deterioration, and sometimes even with organic impairment and degeneration. If, then, as we have endeavored to prove, neuropathic heredity may bring on alcoholism, as it would any other affection of its class transmissible by heredity, we should devote our attention to checking, as far as practicable, the transmission of this taint, which is fatal, in so far as it is a general predisposition. And, failing this, we should endeavor to turn it aside from alcoholism, by guarding the offspring against all opportunity of succumbing to it.

In considering the services, physical and intellectual, which may and should be rendered by every good citizen in a social community constituted as ours is, there is more to be expected from the neuropaths of whatever degree than from alcoholists. These last are not only useless to society, through their mental instability and intellectual incapacity, but they damage the public well-being by their crimes and vices. These evil tendencies oblige the community, for self-protection, to re-

strain the offenders, and, to this end, maintain them at public expense. Though most frequently incapable of procreation, their offspring, otherwise, are but idiots, epileptics, degenerates, who sooner or later become public burdens on society. Alcoholists are useless and may be dangerous for the present, while their detriment to the future race is incalculable; and unfortunately their tyrant ruler daily increases the number of its victims.

Let us return to the gist of our inquiry. In tracing the causation of alcoholism, in general, whether inherited or acquired, we soon perceive that the truly primordial cause of the development lies in the degeneration of the individual affected. The subjects are always hereditarily tainted, such as we have met and studied in the course of this essay; they have acquired cerebral infirmities. In all cases it is the weak in character, those incapable of resistance, without stamen for long-continued reaction, who become the victims of alcohol. The best proof of their deep degeneration may be found in our statistics, where we may see that all the alcoholists in whom the heredity of the taint is not proved have, nevertheless, deep degeneration of the psychic and intellectual powers, in evidence of which we find epileptics and idiots of various degrees in the families of all.

Furthermore, we suggest, without insisting upon it, that the acquired alcoholists themselves—if investigation were carried to its uttermost—might often, perhaps generally, be brought within the category of alcoholists by heredity. Moreau de Tours has shown that hashish acts specifically on those only who are highly predisposed to its influence. This is the case with all other toxic substances, and alcohol among them. "The very act of having recourse to toxic agents," says Déjerine, "might be considered as *ipso facto* indicative of a taint in the subject. Thus it is persons who are easily fatigued, whose faculties wane speedily, who have recourse to stimulants, such as tobacco, morphine, alcohol, coffee. The remedy is worse than the ailment; habit leads to abuse, with all its consequences to the subject and to his progeny."

In acquired as well as in inherited alcoholism, it is the inherent morbid tendency which gives vitality to alcoholism; it is the predisposition, the latent taint, which has been described as "the disease asleep," now ready to awaken. But this

awaking may be brought about by an accident, as, for instance, by convalescence from a grave sickness, occurring in a subject in whom the morbid tendency had been implanted by a heredity of either similars or dissimilars; while in the to-be-acquired alcoholism it needs a cerebral impact or traumatism to start the disease. There is therefore reason for maintaining the distinction between alcoholism by heredity and alcoholism by acquirement.

The importance of social surroundings as influencing the development of alcoholism we believe to be much exaggerated. It is certain, however, that deficient moral training and the prevalence of promiscuous living among the lower orders of the populace, with the bad examples which there surround childhood from its earliest consciousness, do falsify its judgment, blunt its moral sense, and give rise to conditions of life eminently favorable to the development of vice, and more particularly of a vice which they see so prevalent around them, and which is not often enough condemned. Time and again, on a Sunday night, we may see the drunkard's wife go in search of her besotted husband at the grog shop, and with the aid of a mutual friend help him along to his hearth and his children; and having reached home she lays him on their common bed, to sleep off the effects, not with the reproaches that his conduct calls for, but with jokes and laughter at some absurdity or weakness which he has displayed in his cups. What sound and just idea can a child derive from such a spectacle? With the facility of adaptation with which very young children accustom themselves to all sorts of scenes, the repetition of the one we have sketched soon ceases to surprise them. The drunkard's daughter, when she has become old enough, tries to help her mother in attendance upon her father, and thus serves her apprenticeship for the requirements of her own future household. The sons look on and laugh, and seize the first opportunity that comes in their way to imitate their father, and do likewise. And yet, what reproof should they receive; and who should administer it? The father, whom the children have often seen drunk himself; or the mother, whom they have seen laughing at his condition?

It is true that the case is not always such as we have presented it. Many women are mortified and suffer much at seeing their husbands give way to drink, and try hard to spare

their children the sight of their drunken father, and to keep up, as well as may be, the feeling of respect which they owe him. But that which could be easily accomplished in a certain social position becomes impossible in the restricted quarters of the workman, who lives crowded into a narrow space with all his family, where the words and actions of any one member cannot be concealed from the others. Example cannot properly be said to be the guiding influence in such a case; but, rather, and most preponderatingly, it is the habit acquired of seeing drunkenness without being shocked at it, or disgusted by it, and without considering it humiliating or disgraceful, which leads on till it appears almost natural and very little reprehensible. Familiarity with repulsive sights inevitably blunts and finally deadens the repugnance which they inspired before novelty had worn off.

This influence of familiarity manifests itself in physical as in moral matters; examples of it abound all around us. The feeling of repugnance which every normally constituted person should experience at sight of a drunken scene is only weakly developed in subjects predisposed by heredity to alcoholism; it is therefore not surprising that, in such cases, it should readily become weaker and even almost entirely disappear. Thus the progeny of alcoholists will offer a more yielding ground for the impact of temptation and a more fertile soil for the growth of the paternal vice. We see, then, above all other causality, the weakened moral sense, originally weak as inherited from an alcoholic father, blunted still farther by habit, leading the progeny of the alcoholist to the same courses as his ancestor.

Education evidently intervenes here just as it does in the repression of all other bad instincts. In the better classes the boys, from childhood through youth, are most frequently taught and trained outside of their paternal home, and receive, in their schools and colleges, principles of general morality which are pretty nearly the same in all. Education among them has almost always a happy influence, and yields beneficial results. Unfortunately the case is not parallel in the low classes. When alcoholism has once gained a foothold in a family, poverty follows near at hand with all its wretched consequences. The mother, if she is honest and decent, tries to regain by her work that which the idleness of the husband has cost the fam-

ily by the loss of his wages. Instead of giving her attention, as heretofore, to her housekeeping and her children, she is obliged to leave the house to attend to such work as she may find elsewhere. The children are not looked after; they associate with the bad boys of the neighborhood. Often fraught with vicious instincts, they soon play truant from their schools, and it is with difficulty later on that they find a place in some workshop.

From whom in their family could they have received the sound education so particularly needed to guide them in their trying position in life? Assuredly not from the father, a drunkard and idler, nor from the mother, poor woman, who is never at home. If, at least, these children could be removed from the pernicious influence of their family! What boarding school or protectorate is there for such and so many?

We do not doubt that the influence of their present surroundings might suffice to develop a proneness and subsequently a fondness for strong drink in soundly constituted blackguards. How much more intensely felt must be the impulse imparted by it to subjects already predisposed by morbid heredity, whose heredity is weakness of mind, instability of character, perversion of instincts; whose safeguard is a power of reaction and self-restraint less than the normal standard!

These predisposed individuals may have reached, without hindrance, an age of maturity; they may even have passed it; their habits have become confirmed; their characters are fully formed, and, even then, as we have seen, it will need but a minor moral shock to bring to light, as by an explosion, the virulent activity of a hereditary taint which had lain latent in the organism up to the date of the sudden eruption. Now, in a young, impressionable intelligence, in process of development, and similarly predisposed by its heredity, why should not a moral shock, such as may occur any day, produce upon it, more rapidly and more certainly, the same morbid phenomena as in the more hardened case above set forth?

The social surroundings act only as an occasional cause, a prolonged moral shock. The necessary, almost indispensable factor to the development of the vice is the existence of the radical taint, the hereditary predisposition of the subject. But the influence of surroundings, which is of secondary im-

[illegible] which, in case of heredity in similars, is often a [illegible] assumes a much more important aspect in [illegible] heredity in dissimilars. In these latter cases it still [illegible] that heredity is the fundamental and necessary [illegible] the example of drunkenness, the want of moral [illegible] may lead the hereditary neuropath toward alcohol- [illegible] permit ourselves to assume that different influences [illegible] lead to different results, and throw him into some other [illegible] he would still have remained a neuropath; he might [illegible] his taint in one form or another; but he might have become anything else, instead of becoming an alcoholist. For him and for all such, as we have claimed before, it would be of great advantage to steer them clear of alcoholism, its [illegible] and demoralization.

We have been forcibly impressed by a circumstance which statistical classification places in very bold relief; we allude to the fact that women are much less liable than men to inherit the alcoholic predisposition. In our table of alcoholists without proven heredity, we find (in the group of alcoholists whose progeny is not alcoholismic) 82 women out of 154 families of alcoholists who have among their direct progenitors at least one alcoholist, and who, themselves, are not alcoholists. This showing represents, in round sums, one-half of all the cases in which alcoholism is not transmitted. If we stopped our investigations at this point, we might logically conclude that women are but little more than men exempt from alcoholism by heredity. But we must go farther, and investigate the record of the cases in which alcoholism is transmitted. For this information we must consult the statistical tables of alcoholists by heredity. A mere glance at these will suffice to show us that the immense majority of hereditary alcoholismics are males. But when it does show itself in women, it seems to take on in them a type of greater gravity and intensity than in men.

We may admit that the difference of professional occupations, the education, the opportunities, the harder work, urge men more than women to take on alcoholic habits. But, still, how does it happen that woman, more nervous in her mental as well as in her bodily constitution, more emotional, more impressible, more yielding physically, offers less hold, less receptivity to alcoholism than man, notwithstanding the

sameness of heredity in both? This is, however, unquestionably the case; we need no further proof of it than the fact recorded of finding in one family alcoholism attacking the boys, while the girls are attacked by neuropathic affections of one form or another. Such cases have been noted by all specialist observers as occurring in the families of alcoholists.

Why, we ask, should it occur that of two subjects, each having the same hereditary predisposition, that particular one in whom the predisposition is still further increased by a more sensitive and excitable condition of the nerves, should be the one spared; while the other subject, more resistant and less handicapped, should be the one attacked? The state of circumstances, as we have already presented it, will account for this in part; but we believe that this comparative immunity depends most largely upon the distinctive characteristics of woman's nature. Woman, even when degraded to a very low level, preserves still a certain bashfulness or external modesty, which may not be always evident, but which may be aroused on suitable occasion. This idiosyncrasy may be verified in the hospitals, among that class of patients whose vocation demands the compulsory abandonment of all decency. When we see this feeling (which is much less marked in men) still cling so hopelessly and inveterately to womanhood, however degraded, we cannot be unwilling to admit that it may exert a saving influence for good, by making her hesitate to expose herself in the begrimed and repulsive garb of besotted drunkenness. She knows, too, the disgust she will generally inspire in men, if seen in this beastly state, and the motive of self-love may exert an appreciable influence.

And, again, the tastes and the pleasures of women are different from those of men; the purpose and the course of the gatherings of women and young girls are also different from those of men. Their meeting places are different; women have no special rendezvous; whereas men have the saloon and the bar-room with their corresponding usages. The principal reason, in our view, of the non-transmission of alcoholism from father to daughter, seems to inhere in the idiosyncrasy of woman, and in the habits peculiar to her sex; and these traits of character and usage assume varying degrees of intensity, according to the social surroundings of the woman and her previous training and education.

Let us now consider the third and last group of great general causes, which may aid or hinder manifestation of the inborn, inherited tendency, which occupies our attention. Under this heading we include the sudden and often violent changes which occur in the social and political practices of the people, producing far-reaching modifications in the national life. It is probable that these violent changes exert an active influence on alcoholism, as they demonstrably do on insanity, and all the psychic monstrosities. Laborde, Lanier, and Mundy have shown their agency in developing these last-named abnormities; but the part played by alcoholism, either actively or passively, in these commotions, is not so readily either measured or traced.

Crothers ("Med. Record," p. 402, 1881) goes so far as to suggest that alcoholism may at times become epidemic in its visitations; that it has a recognizable cycle of revolution and obeys, in following it, a great psychological law—as yet unknown. "In studying the social history of any agglomeration of persons," he says, "it may be seen that drunkenness appears at intervals with great intensity; then disappears at other times, to return after a period. Alcoholism is also endemic and concurs with certain local causes more or less easy of detection. Popular elections, political revolutions, social changes, are all marked by fluctuations in drunkenness."

We have no observations of our own to offer; we are inclined to admit the influence of social causes, but we do not feel competent to form an absolute opinion as to the importance of this factor.

Let us next examine the influences which act in the development of alcoholism in the individual, during his childhood, his youth, and his adult age. The active influences, generally, vary for each of these periods; although sometimes a like influence may act in two adjoining periods of life, as in childhood and pubescence, or in adolescence and manhood or maturity. Between these marked periods of life there are other periods of transition, where the influences belonging to the bordering ages may and do intermingle and antagonize each other. It is therefore at the middle time of each period that we should study these influences.

Lancereaux has said that it is at the periods of the great physiological changes, such as puberty, the commencement of

menstruation, pregnancy, the menopause, that alcoholism most frequently manifests itself. This is strictly true, and we have frequently noted down this concurrence in the course of our observations. It is in fact at these great physiological epochs that the indviduality, somatic, intellectual, and moral, of the subject emphasizes itself, or transforms its being. These physiological changes cannot be accomplished without involving great functional derangement and discomfort to the patient. In some cases, however, they occur without attracting much notice; but, on the other hand, in many others, they bring on physical and mental disorders, varying in intensity and duration. We shall not enter in detail upon this subject; we merely suggest the inquiry whether it is to the physiological modifications alone that we must attribute the concurrent nervous and intellectual disorders, or whether we must not limit our recognition of this influence to one of simple, accidental causality, for the awakening of a latent heredity in organs already predisposed. I have no doubt of the correctness of this latter interpretation.

The contagion of example has been invoked to explain the appearance of alcoholism, more particularly in children. Granier expresses himself thus: "Some cases, children for example, are unconsciously but fatally led on, carried away by the example of their parents, and intoxicate themselves without knowing it. Later on, as they advance in years, the habit, grown with their growth, has become fixed, confirmed. Sons of alcoholists, they show the same mental condition which is habitual with their fathers; they can no longer avoid the fatal tendency; they glide down into the category of alcoholists who toxicate themselves knowingly, for gratification of their morbid instincts or appetites."

We believe contagion by example to be less frequent than it is represented to be; and that, when it does occur, it is through the process of which we have already given the rationale; that is, by influencing a subject, already predisposed by heredity, to develop in due time the alcoholism which had meantime been latent or dormant in his system. We inquire, would the influence of example explain the appearance of alcoholism, as we see it seize upon young men just leaving college or their boarding schools, when these young men have been raised from childhood away from home, and beyond the depressing sight

of their parent's drunkenness? And again, how could the influence of example account for the development of inheritance in dissimilars, when we see children born from parents who are insane and degenerate—but not alcoholic—manifest at very early age a proneness for strong drink? Lancereaux calls attention to the fact, and by sound reason enforces the conclusion that, actually, there is an inherited morbid tendency at the root of the phenomenon; inasmuch as it is *not* the sons of drunkards, with acquired habits (however frequent may be their indulgence), who manifest, of a sudden or at a predestined time, a yearning for strong drink; but it is the progeny of those hard drinkers who are tainted with chronic alcoholism, and who by this taint are, in a measure, incapacitated from bringing on the phenomenon of drunkenness.

We subjoin the instance of a child, neither of whose parents, nor any known progenitor, was an alcoholist; yet the child manifested at a very early age a yearning for strong drink. His family was degenerate cerebrally, as shown by the mental condition of the child himself and by the strabismus of his two sisters.

Case LXXX. (unedited). — Gay., age 13 years, congenital imbecility, mental instability, kleptomania, alcoholism. Father sober. Paternal grandfather, total abstainer. Paternal aunt died at 12 years of lung disease. Mother, illegitimate child, father and mother unknown. Two sisters of patient both strabismic. Patient is a thief, liar, rough mannered, mischievous, wicked, lazy, stubborn vagabond; secret tippler; broke the top off the bottles in the cellar and drank the contents; five times he got quite drunk during his mother's absence; at one time he was delirious and remained so for twenty-four hours; on one occasion he drank at a single dose a pint and a half of absinthe at a wine shop and soon lost consciousness; he preferred drinking secretly to doing so before any of the family, to which last he strenuously objected.

In the following instance, alcoholic heredity in similars is manifestly the cause of the precocious fondness of the child for strong drinks, independently of any influence of example; since at the time of the child's birth the father had already ceased his excesses in drink.

CASE LXXXI. (unedited).—Huc., Frederick, age 4 years [14?], imbecility, fits of anger, klastomania (desire to break things), wickedness, kleptomania, alcoholism, onanism [at age of 4 years?]. Father, æt. 36, painter; at 13 to 14 years, giddiness and loss of consciousness, for which he was frequently bled and with good results; he was of plethoric temperament; had intermittent fever while in Africa; in youth drank a great deal of absinthe; after his fever he became sober and has continued so since; he smokes a great deal of tobacco day and evening to keep himself awake; his disposition to sleep is not so good at night; he is obliged to sit up all of one night each week, and part of the night more often. After these wakeful spells he becomes deaf, the deafness lasts seven or eight hours, and is complete in both ears; at the same time he has pain in the top of his head; these symptoms pass off with sleep; violent in anger; breaks everything that he can lay hands on. Paternal grandfather likewise violent. Paternal grandmother died of chronic rheumatism and cerebral rheumatism at 63 years; she was already subject to frequent attacks of rheumatism at the time of her marriage. Paternal uncle, æt. 40, articular rheumatism; drinks a great deal, especially beer. Paternal aunt articular rheumatism. Mother, æt. 35, weak-chested; drinks a great deal; often gets drunk; was formerly a barmaid in a beer saloon; became immoral; when she became pregnant, the putative father continued her protector until birth of the babe, after which he left her, and kept the child, which he acknowledged to be his own. Patient had meningitis and convulsions at eight months; about this time he had a severe fall, striking his head; filthy in his habits; he drinks wine unto drunkenness; during the absence of his father's wife he got drunk and continued so for three or four days; his most frequent thefts were wine which he drank.

In this case we cannot bring to bear the example of either the father or the mother. We may take note of the connection which appears to have existed in the father's family between alcoholism and rheumatism, which was hereditary in this family and which attacked the brain of one of the ancestors. This instance points to the connection between the rheumatic and arthritic diatheses and the group of neuropathic affections; scientific observers, at the present day, tend more

and more toward full admission of their intimate relations to each other. We have seen this precocious yearning for drink manifested by children in several of the cases we have recorded. In the majority of them hereditary influence is so manifest that it becomes unnecessary to seek additional cause; were such cause found, it would be only accessory at best, however aggravating it might be in its action.

We have said elsewhere that the drunkenness of the parents at the moment of conception implants most frequently in the offspring a degeneration so profound that it incapacitates them from addicting themselves to alcoholism in the future. At variance with this view, Crothers ("Med. and Surg. Reporter," Phila., 1883, p. 549) adduces two cases of alcoholism occurring in such progeny: in one of the cases only one of the parents, the mother, was intoxicated.

It is known that in certain countries the custom prevails of giving brandy and other alcoholic liquors to children with a view to strengthen them and aid them in the process of dentition. In other localities the usage is to give to the nursling a false nipple or tampon of lint or sponge dipped in spirits, brandy, or whiskey, for similar purpose. Either of these practices or any other similar treatment might possibly create an artificial need of, or a fondness for, the liquor administered; but we have met no such case within our own observation, nor have we seen any recorded experience of any. And it must not be forgotten, in our appreciation of causes, that it would be generally those parents who are themselves in the habit of seeking relief for all their aches and ailments of whatever kind, in strong drink, that would be most apt to use similar means of treatment for their children. If then these children become precocious bibbers, we may call to account the paternal heredity for dragging them into this defilement.

Cases are also reported where the parents have amused themselves by making their children drunk. But even such brutal amusement is not apt, of itself alone, to generate alcoholism; transient drunkenness does not produce so permanent an impression, and, fortunately, such cases as these are very rare.

Let us sum up. Example and habit given, viewed as causes for precocious fondness for strong drink in certain children, are far from being of such frequent occurrence or energy of

action as to explain satisfactorily the occurrence of the phenomenon in the majority of cases. We must consider perversion of their instincts, and an inherited unconscious impulse to be the true underlying causes of the morbid appetite in these mindless victims.

In youth, as we have already seen, it is the great physiological evolution of puberty which is incriminated to account for the new propensity; it is the one among the critical ages of life which impresses the most numerous modifications in the entity of the individual. In it the character of childhood disappears and that of the man commences to be outlined; the intellect seeks development in the direction which points to its future maximum of strength and fertility. At this period the nervous and physical equilibrium is very unsteady and easily upset by the smallest accidental cause, occurring in subjects of normal organization. It must not surprise us that this occasional accidental cause should act with intensified energy on an organism already predisposed by heredity to receive its impact.

And, let us notice furthermore, that it is not most frequently at the age of thirteen or fourteen years, at the very moment of the development of puberty, that precocious alcoholism manifests itself. It either shows itself very early, at the age of about five or six years, or it is delayed until sixteen or seventeen years. Now, to what does the age of seventeen years correspond; to some physiological development? Yes, undoubtedly, in part at least; but, probably, this particular age owes its special importance to the change which then occurs in social position; and this change occurs to the youth in any rank of life in which he may find himself at the time. In the working class the young man ceases to be an apprentice by becoming a journeyman; in the comfortable classes he leaves college or school, to enter upon a liberal career, whether his books be those of the office or the counting house, or the workshop or the factory. He seeks to imitate the manhood which he has, as yet, barely reached, and, that he may prove himself able and ambitious, he is willing to face any ordeal. And, again, about this same age, there occurs generally an evolution in the genesic sense, and the young man first tries his powers in sexual encounter. This frequently is a cause of excess in drinking; and we have seen elsewhere

what frequent and intimate reaction occurs between the passion for women and the proneness to drink. This influence is probably less felt among young men of the manual laboring classes, than among those who are less actively and fatiguingly employed—the middle classes. At the present day, particularly, those resorts where young men seek easy conquests are, almost without exception, places where they are tempted and even shamed into indulgence in drinking. If the young man has not the will and the firmness to resist the allurements of idleness and depravity which reign in the beer gardens and music halls, if he has his moral sense numbed or blunted; if he is lazy, lethargic, slow of mind as well as body—if, in short, he has implanted in him, weighing him down, a grievous heredity, how can we expect him to escape from, or even for long to delay, his succumbing to alcoholism, which is the fatal consequence of frequenting such haunts?

Laziness, weakness of moral sense, want of firmness in resistance and of energy in action, enervation of character, are the true, the moving causes for the development of alcoholism in young men. And, while we admit that these traits are in some cases accidental, we claim that they are oftener the outgrowth of heredity from an ancestry more or less deteriorated. "Like father, like son," is an old adage. Bad company, pernicious association, the desire for sympathetic fellowship or, rather, the cowardice of the vacillating, which makes them give way before a temptation which their reason prompts them to resist—these conjoined are more than enough to lead them straight into the snare, into the toils of alcoholism lying in wait for them.

And if these conjoined influences lead them into alcoholism, in advance of, but not to the exclusion of, other vices and depravities, it is because alcoholism is more readily within their reach; they would succumb to any other passion; they would contract any other vice, if the opportunity for its gratification were equally accessible.

It is these young men of feeble character, who might as readily turn to good as they do to the bad, that cause reasonable fears in their mothers' anxious breast, lest they fall into the clutches of wicked and unscrupulous women. With such an irresolute youth, indeed, his first mistress has an immense influence over all his after-life, for good or evil, as she may be intelligent or thoroughly vicious.

How many do we see of these unfortunates who, from the very moment of their arrival in Paris, are ensnared in the toils of some girl, who degrades them in intellect and moral sense, as much as she weakens them in physical strength, and who trails them along after her to the foul-famed taverns and dives, where they can drink their fill, and become alcoholized, under her experienced leadership? How many of these disappear at the end of a year of Parisian life, called home in haste by their affrighted parents?

Nor is this experience exclusively distinctive of Paris; similar incidents occur in all large cities. If we address ourselves to the young men for information, and investigate their hereditary antecedents, we shall find, most frequently, that their father has been, in his younger day, a free liver, and that the recollection of his past prowess inspires him with indulgence for their similar wanderings from the straight path; and he rests contented with the reflection that early manhood "must sow its wild oats." But, unhappily, that which was merely transitory in the father has become permanent in the son, by virtue of the burden of accumulated heredity; and where the father resisted and stopped, the son vacillates and is dragged on to the fatal end.

In the working classes it is laziness, that prolific parent of vices, that begets alcoholism. We have already seen how the unfortunate children of drunkards are most generally neglected in all their intellectual and moral requirements. Whence, then, could they derive the will to work, the love of order and economy, the loathing for vice? It is for want of these that they grow up bad workmen, and are so often idle, sometimes by choice, but oftener probably forced to it by the successful rivalry of better hands. And, during their idleness, what can they do outside the workshop except go to the saloon or the barroom, and talk over matters with their comrades who are in the same predicament as themselves? And thus they learn to be more familiar with the saloon counter or the bar than with the workshop bench.

What shall we say of the military service? It is pernicious when we consider its bearing on the propagation of syphilis; it is in no way less so in its influence on alcoholism. We shall say nothing of the regiments in Africa, and the troops on colonial service, where the habit of taking drams, of absinthe

especially, is considered to be innocuous, and by local prejudice even deemed beneficial in each particular climate. But we shall cast a passing glance at what occurs in home barracks, where the canteen is almost the only place of distraction or recreation of the soldier, his refuge during his first days of homesickness, his resort during subsequent idleness, enforced idleness except at drill hours and mess duties; this glance, however cursory, will not fail to reveal how the fondness for strong drink comes almost inevitably to smirch the soldierly bearing.

Our review carries us next to the vicissitudes of adult age; all the causes which we have heretofore noticed may intervene at this period; we shall seek to specify such of these as may be considered to be, in a measure, peculiar to this time of life.

Occupations and professions have been considered as exerting special causative influence; all authors attribute to them far-reaching action. Magnan and Bouchereau have grouped, according to frequency, the professions which favor the development of alcoholism. I quote their words: "In studying alcoholists from the standpoint of their professions, we have found alcoholism mostly in persons who are engaged in mechanical and manual occupations; next follow the industrial and commercial professions; the category of wage earners comes next. Certain professions, where the manner of life is similar for the two sexes, appear to furnish about an equal number of alcoholists from either sex; examples of such occupations are laundrying and cookery. The learned professions show few alcoholists, and the subjects attainted were generally outside the bans, had lost their standing, were self-styled teachers whose licenses had been forfeited, and who had ceased to practise years before." (Statistics of alcoholists admitted to St. Anne's in 1870, 1871. "Ann. Méd. Psych.," 1872, vol. I., p. 52.)

Undoubtedly the manner and amount of occupation exercise considerable influence upon personal habits, and it is well to use all available means to estimate their importance. But the showing obtained may be, and, we believe, sometimes is, exaggerated. We cannot believe, for example, that all the wine venders and all the washerwomen are alcoholists. We imagine that, in spite of care taken, there is ground for supposing that the occupation named by an applicant for admis-

sion is assumed as an excuse, in some way, to palliate his previous excesses.

We submit the following case as interesting in its bearing on occupations and their influence. The two sons of an alcoholist are hereditary alcoholismics; one of these sons is a wine vender and the other is a farmer. Can it be said that it is only because he was in the wine trade that the first of these sons took to drink, when we see the second brother do absolutely the same thing under conditions and surroundings entirely different? It appears to us more reasonable to invoke the influence of heredity, which is the same in both, and which, by-the-by, manifests itself also in a sister of the two boys. This sister, in apparent good health, gave birth to a child who died of convulsions, and then to a second who at an early age had chronic headaches.

CASE LXXXII. (unedited). — Caldair., age 12 years; epilepsy. Father, æt. 51, cattle feeder, appears to have had osteomyelitis at 8 years; no convulsions in childhood; no rheumatism; no headaches; was in the habit of drinking very freely at and about the period when his children were born; he drinks much less now. From early manhood he has continuously been addicted to drink; from the time of his marriage, at 31 years, he has indulged in daily excesses; about this time also he went into business as a wine dealer; he is violent, ill-natured; breaks everything around him when angry; he now drinks less since three or four years, for fear of bringing on an attack of sickness. Paternal grandfather, farm-hand; cause of death unknown; very violent; very heavy drinker. Paternal uncle died at 50 years of disease of the liver; farm-hand; alcoholist. Paternal aunt in apparent good health; she has borne two children, one of whom died of convulsions; the other has chronic headaches since childhood. Mother, nothing notable except weak intellect. Maternal grand-aunt almost idiotic. Maternal aunt somewhat idiotic. Maternal uncle imbecile. Five uncles or aunts died in childhood. Brother, æt. 19, no convulsions in childhood; in good health; enlisted in the marine corps and sent to sea, because he was "a great blackguard"; kleptomania from early age; he collected his father's bills and kept the money; he stole from his parents all he could and sold the plunder; he began the habit of strong drink at age 14 or 15 years.

The preceding observation is interesting also as showing the correlation between hereditary alcoholism and epilepsy to which we have called attention in previous cases. We must not forget the distinction between alcoholism and habitual drunkenness. It is perfectly possible to be alcoholismic without being an habitual drunkard; but, on the other hand, it is almost certain that the habitual drunkard will become alcoholismic. One may even have the alcoholismic taint and yet have no fondness for drink; whereas we cannot conceive habitual drunkenness without an appetite or yearning for strong drink, distilled or fermented. In many trades the workman takes, from time to time, a "short nip," or small drink of spirits, to renew his strength, to refresh his energy for work; at least so he thinks; while, in reality, he is slowly bringing on a condition of toxication, placing himself thus thoroughly under the influence of the poison. But this manner of becoming alcoholismic, which we may occasionally trace in the progenitors of alcoholismics, seems to be, in its manner of indulgence, not characteristic of those alcoholismics who have received their taint by inheritance. In this class the alcoholism develops itself, most frequently, in a subacute form; that is, we do *not* meet here the chronic use, pure and simple, of the stimulus, however frequent the repetition of the doses; but we have spasmodic attacks of excessive use of strong drink that come to our notice in sharp onsets.

A wine vender, a bar-keeper, from a sense of business, may deem it expedient, from time to time, to set the example of indulgence by "treating"—and by repeating this he may become, himself, alcoholized or bring on alcoholism, although he be not tainted by heredity. But if he has inherited the taint, his invitations will be mere pretexts for him to indulge his appetite and have the pleasure of drinking with his customers; and he won't stop at the limit of business requirement (although this of itself would suffice, if long continued, to run him into alcoholism by acquirement, if he were not an heir to it), but he will drink on, when there is no external necessity for it, until he reaches, at times, tipsiness, and, later on, complete drunkenness. In the latter case the alcoholismic becomes an inebriate. In the former case the social bar-keeper, if he does not discontinue his practice, as he readily may, in safe season, will become simply a chronic alcoholist, a habitual

drunkard, albeit destined, almost beyond retrieval, to future alcoholism in himself and in his progeny.

At this stage the question presents itself of the susceptibility to alcohol as manifested by hereditary alcoholismics. Most authors declare that degenerates, neuropaths, the progeny of alcoholists, are more sensitive to the effects of alcohol, and of toxic substances generally, than are normally constituted individuals. This increased susceptibility exists undoubtedly in very many cases; but there are also many exceptions to its prevalence. We have seen an alcoholist by heredity (Case LXV.) "of great susceptibility; with one quart of wine he is drunk," and another of whom his companions said: "as to you, merely walking through a vineyard does the job for you." We might multiply such instances. On the other hand we have observed, in many instances, an exceptional tolerance. Such is the case (Case XXXIV.) with the alcoholist who made the bet with one of his comrades as to which of them would drink the most; he actually did, at the time, drink daily a quart of absinthe. A hysterical subject, attacked by the cramp frequent with those of his trade, was obliged, in order to overcome his functional spasm, to take three or four vermouths and five or six absinthes in rapid succession; with one absinthe less than his allowance, he remained unfit for work; the clearness of his head and the steadiness of his hand were obtained by nothing less than the usual dose. When he felt that his job lagged, he came down from the work-room, gulped down dram after dram, until he had swallowed his enormous dose of absinthe; then he returned to his work, which he took up again with ease and correctness. We kept this case under careful supervision for a considerable period; notwithstanding this immense ingestion of alcoholic beverage, continued with frequent repetition during nearly three months, he at no time manifested any alcoholic ailment whatever. Since he has discontinued his work as compositor, he has readily returned, with a little effort of will and without the least inconvenience or suffering, to a very moderate ration of wine and spirit.

We have, on other occasions besides the above, been forcibly impressed by this tolerance, which is often very remarkable. Morel has called attention to the very great tolerance shown by degenerates, hypochondriacs, and others of the family.

We may add here that this ability of drinking largely, without incurring bad consequences, tends naturally to encourage those alcoholists who possess this immunity, to continue their libations; but as the alcohol, none the less, acts in the course of time, there ultimately arrives a day when, suddenly, there bursts forth some violent manifestation of its long-concealed, secretly-working activity. We have sought in vain a satisfactory explanation to account for these individual differences.

We have had opportunity to conduct only very few observations looking to the quantity of stimulant necessary to bring on drunkenness, with no definite results.

In these, we have thought that we could discern that alcoholismics by "heredity in similars" had a somewhat exaggerated susceptibility; while in hereditary neuropathics and vesanics, on the contrary, the tolerance was increased. This seems logical; for, in the case of neuropaths, of degenerates of the less degraded types, of candidates for insanity, the cerebral action requires constant excitation to keep it in operation; in some cases tea and coffee may suffice; but morphine and alcohol are the ready resource of most of these deteriorates. It has been said that the great Pitt never delivered more eloquent discourse than when he had previously aroused his genius by unusual potations of generous wines. There exists in Paris a special tavern—there may be several, for aught I know—where none but the initiated meet; their sole beverage is absinthe. It is a curious study to watch these men for whom absinthe serves as meat and drink, almost their only sustenance; and who gather to this haunt, that its aromatic vapors and emanations may inspire them in the composition of drawings, of literary items, of newspaper correspondence, etc. They converse little or not at all; they habitually occupy the same seats, and the waiter, who knows them all, supplies each without receiving orders from him. He knows the dose for each, and as soon as the first absinthe is disposed of, he serves a second and a third, continuing to replenish, until the daily "quantum suf." has been reached. As in the case of the hysterical compositor whom we mentioned above, these thinkers seem to require an exact quantity of the toxic to bring them up to the notch of normal stimulation. This tavern attendance forms a daily feature of their life; at certain

regular hours they are never absent, nor do they make occasional halts in their routine, until the day comes when they disappear to return no more forever.

We have spoken of the capacity for toleration; we see in this tavern an atmosphere crowded with such manifestations. These workers, who are thus, at frequent intervals, obliged to have recourse to a stimulant, either to raise their faculties to their normal level, or to maintain them at this level for an inordinate period—in short, to overwork their energies—are to be met with, as is reasonably to be expected, among the higher orders of the educated classes. Morphine is undoubtedly often resorted to, to replace alcohol for their purposes; its use is more convenient, and less repugnant to cultivated minds; and this is consonant with the expressed opinion of Déjerine, who considers the act itself, of having recourse to any stimulants to excite unusual action, as already constituting a sign of morbidity.

Alongside of those who use alcohol because of a presumed necessity arising from or pertaining to their severe and exhausting work, mental or intellectual, there may be classed those who alcoholize themselves for a therapeutic purpose, real or imaginary. Any one who has spent much time, who has lived for even a short time, in the midst of working men, and more especially among working women, has had occasion to learn the important rôle played in popular therapeutics by the nostrum known as "vulnéraire" (arquebusade). It is especially among women that we see them develop alcoholism; the bestial drunkenness of man is repugnant, as we have already said, to the generality of women. When the yearning for strong drink exists in them, however, they gratify it; but with subterfuge and greater regard for appearances. If woman is ailing, and the least ache suffices, she will not have recourse to brandy or whiskey to soothe her pains, but she will at once take some aromatic tincture; she seeks relief at the apothecary's, not at the grocer's or the grog-shop; she is "perfectly proper." All the lesser ailments and complaints, so frequent among women, find in the apothecary shop some universal and incomparable panacea. Many women will acknowledge to you that they always take their "bitters" the first thing in the morning, to give them strength for the day; and we have known many who, under one pretext or another,

often most futile, repeat the dose five or six times through the day.

Thus, too, sometimes, we see hypochondriacs give themselves over to strong drink, as treatment for their imaginary diseases; unless, indeed, they have recourse to it to stupefy and destroy themselves (of this last Morel gives us a marked case). In this last-named class of cases, the alcoholismic diathesis is evidently complicated with some morbid condition of the thinking faculty. The analysis of this involves a question of great importance, and requiring very cautious treatment; namely, the relations between alcoholism and insanity.

Esquirol is, we believe, the first writer who has pointed out that the propensity for drink might depend upon an inherent morbid condition. Morel says upon this subject ("Dégénérescences," p. 131): "Two considerations lead us to say a few words concerning the tendency to strong drink growing out of special diseases. It is important, in the view of legal medicine, that it should be well established that all the disasters which follow in the wake of abuse of spirituous liquors, are not to be exclusively attributed to the perversity of human nature; but that in certain situations man is irresistibly pushed on to the committal of acts which would be amenable to legal punishment were it not for the want of moral liberty on the part of the offender."

From 200 alcoholists, who have served him for his studies of chronic alcoholism, he has excluded 35, whom he classifies among persons having a fated propensity to drink, traceable to a morbid diathesis; in 10 cases this morbid yearning had been brought on secondarily by general paralysis, in subjects previously sober; in 10 cases, of whom 6 males with hychondria and 4 females with hysteria, the propensity to spirituous drinks added itself to the pre-existing neuroses. In all these cases heredity is more than probable, and Morel says that his purpose was to show the tendency to drink, as developed under the combined influence of disease incident upon a pre-existing inherited diathesis.

Moreau de Tours expresses himself thus ("Psychologie Morbide," p. 156): "According to our views, in the majority of cases, the habit of drunkenness arises from a special condition of neurosis, which, if it be not real delirium, insanity properly so-called, is a prodrome, a first gleam of its near approach."

After repeating the opinion of Esquirol, just quoted, he adds, "In developing this observation of the master that the propensity for strong drink might depend upon an inherent morbid condition, we are led to observe that a great number of habitual drunkards are also predisposed to nervous diseases either by heredity, or by their peculiar diathesis, or finally by physical or moral influences external to themselves. There is therefore a double risk of hereditary delirium for the progeny of habitual drunkards, if a nervous morbidity exists prior to the drunkenness itself." This is precisely the opinion which we advanced to explain the subordinate rank in the causation of alcoholism in hereditary alcoholismics which we assigned to the various social conditions and other surroundings, such as are habitually adduced to account for alcoholism in these and other cases.

Is alcoholism the cause of insanity; or is it merely a first manifestation of it? This question is of course most difficult to answer decidedly. It is particularly so in cases where alcoholism has developed during the preliminary stages of general paralysis; and such cases are quite frequent. Have we before us an alcoholic general pseudo-paralysis? Or, have we a genuine paralytic, who in the early period of his disease has committed excesses in drink, and do these now add a characteristic symptom to his ailment? We know that he has committed these excesses, as he has others in venery and in any other form of sensual indulgence, and all of these with the exuberant activity which is as deceptive as it is characteristic.

We shall not recur to the close affinities between alcoholism and general paralysis which we have already discussed; we shall add merely one remark—that, when we see an adult, of previously moderate habits, break out suddenly into alcoholic excesses, we must keep watch, we must sound the alarm, for, before long, we shall see our patient attacked by some form or other of insanity, or of general paralysis.

We have given one example of this in Case XXXIII. which we quoted from Bonnet; and we have, at this time, under our observation a merchant who had continued sober till 40 years of age, and who, about one year ago, commenced to drink absinthe, which he had never tasted before. He does not get drunk, but, being seized with inordinate thirst, he drinks, in immediate succession, three glasses of absinthe before his din-

ner, and oftentimes he takes other glasses between meals. For some. time we noticed mistakes, by no means inconsiderable, in his speech; sometimes even a want of consecutiveness in his ideas. Shall we consider his a case of probable general paralysis of alcoholic origin and as yet in the preliminary stage? Or, is it to be a typical general paralysis which is beginning to manifest itself by his inordinate consumption of stimulant? The future must decide; the prognosis is very grave.

Whether alcoholism be the cause of the development of insanity, or whether it be a consequence of it, its earliest apparent symptom—it is in either case allied with heredity: without a hereditary diathesis to predispose it to develop in the direction of insanity, alcoholism of itself could not produce mental alienation.

We have spoken of cases where alcoholism is combined with a sudden unexpected outbreak of insanity. We place, in juxtaposition with them, those other cases where alcoholism bursts forth suddenly, under influence of some cause external to the individual. Fusch mentions a dissolute drunkard who, after plunging all his family into abject poverty, ended his life by hanging himself. Two of his sons, who had barely reached manhood, were victims to the same vice of drunkenness, and a third one, who had remained sober till the age of 30 years, suddenly became a drunkard.

Taguet, in his essay on "Heredity in Alcoholism" ("Ann. Médic. Psych.," 1877, Vol. II., page 5) says: "Alcoholism of similitude (alcoholism by heredity in similars) presents itself under two aspects—in the latent or dormant state, when it requires for its evolution external example or special imitation; or else it bursts forth suddenly and unexpectedly, without any possibility of detecting any immediately causative influence." This covers exactly Fusch's case; but most generally the cause which arouses the slumbering, latent heredity is known or may be easily traced.

Crothers cites a remarkable example of this ("Alienist and Neurologist," 1882) in a study on habitual drunkenness, considered from a medical point of view.

CASE LXXXIII. (Crothers).—Among the antecedents of this patient we notice, besides habitual drunkenness in the parents, a serious wound received by himself at 13 years.

Crothers, who considers habitual drunkenness to be an organic disease, traces its cause not only to the inherited predisposition of the patient, acquired from his parents, but also to the wound received by himself; which last he considers to be the exciting cause of the outbreak of the disease. The patient in this case is one whom Lasègue would style an "acquired cerebral"; that is, one having an acquired cerebral injury or ailment; but he has this and more besides. When an "acquired cerebral" becomes an alcoholist, he creates for himself a general psychical revolution and a nervous weakness comparable to those resulting from heredity. Inversely, in Crothers' case, it is a cerebral injury which is superadded to the inherited taint, as if the latter were not, of itself, sufficient.

Numerous and careful investigations have been made, and much has been written upon the connection between traumatism and alcoholism which frequently concur in the adult, the former being a frequent cause of the latter. Unfortunately, as in the essay of Peronne (1870), the question of hereditary influence seems to have been overlooked, or to have been considered as having no connection whatever with the subject of alcoholic delirium as developed after traumatism. Numerous fine-spun theories have been invented to explain why one wounded man, who is an alcoholist, has alcoholic delirium, without asking why another wounded man, under precisely the same conditions, is free from it. In our opinion, and we have already dwelt sufficiently upon the subject, those alcoholists who have delirium tremens after traumatism have it principally on account of their hereditary predisposition. If, as in the case reported by Crothers in a subject with latent hereditary alcoholism, we see this dormant taint burst forth under provocation of a wound, is it not easier to admit that a traumatic shock to the nervous system of a hereditary alcoholismic—with morbid cerebral predisposition superadded—should develop still more readily the phenomena of alcoholism? Bataille, in his essay on "Traumatism and Neuropathy," more conversant with the current ideas of the day, says: "It is reasonable that traumatism should act most frequently as but an incidental cause, in an individual who has a permanent predisposition, which may be demonstrated by analysis of his antecedents. When neuropathy appears in an indivi-

dual who has inherited the taint, traumatism seems to act merely as an excitant, which sets in operation a pre-existing diathesis." What Bataille has said of neuropathy we may, in turn, say of alcoholism.

We have seen, while studying the relations of epilepsy and alcoholism, that the appearance of this neurosis may be followed by alcoholism, and we have cited two cases clearly showing this sequence. Epilepsy in the adult acts in such case only as an accidental cause, as a psychical traumatism, if we may use the figure of speech, which serves to complete the action of heredity, and put the alcoholism in operation.

In women, the menopause seems to be a stronger exciting cause than puberty or pregnancy. We already know how important a part it plays in the development of dipsomania; in which its influence has been noted by many authors. It appears to have a similar influence in awakening dormant hereditary alcoholism; nor should this excite surprise when we consider the general commotion of the system which occurs at the critical age in woman. We call attention, in this connection, to Case XXX.

Pregnancy, also, frequently gives rise to excesses in drink. The indulgence in these excesses is excused by the yearnings of the prospective mother. These may be merely a pretext, or they may be another name to cover an unconscious necessity. Little attention, however, is generally paid to the analysis of these cravings, so as to trace them to some rationally assignable cause. Perhaps such investigation might reveal that these cravings (especially those for strong drink) occur most frequently in persons who are predisposed by heredity, and that the proneness to drink liquor during pregnancy, although a mere transitory impulse, however strong, is in reality a more or less attenuated revelation of latent dipsomania. We have an instance of this in the following case, which shows that pregnancy was merely a pretext for increasing the excesses in drink to which the subject was already addicted.

CASE LXXXIV. (unedited).—Lel., Eugenie, age 14 years; imbecility. Nothing noteworthy on the father's side. Mother died, æt. 36, of lung disease; was very nervous; had several nervous fits; anger frequent and violent; often beat her child without cause; odd, whimsical, deceitful; she kept a

furnished house and rented rooms; married at 29 years; not debauched; most frequently she drank brandy; was found drunk several times; in this state her groans and wailings were inordinate; at the time of her pregnancy she had already commenced to drink moderately; she then took brandy very freely, saying that "it would make the baby fairer." Maternal uncle had incontinence of urine for fourteen or fifteen years. Maternal grandfather, queer fellow, habitual drunkard, perished in the snow, alongside of a wall, being drunk at the time. Maternal grandmother died of lung disease.

In all such cases the real, deep-seated, primordial cause is heredity, which has created the predisposition. Whether it be insanity, epilepsy, a cranial traumatism, an acute disease, or a transient physiological condition that figures as exciting cause, it is such in appearance only, and acts only by upsetting a nervous system, already ill-balanced, and requiring only a final shock. This determining nervous affection, instead of lying dormant until adult age is reached, may awaken in the child; and if compatible with the other conditions of his existence and surroundings, may provoke the precocious development of alcoholism in the child predisposed by heredity, just as it would in the adult subject similarly tainted.

CASE LXXXV. (unedited).—Mor., Charles, age 17 years; slight hydrocephalus, epilepsy, vagrancy. From the age of 6 years, his mother having died, his father allowed him to run at large with other children of his age. He drank with his elder brother, who took him along to the grog-shop. At 8 years he showed the first signs of epilepsy; this was attributed to having been frightened during his tramps, and to having drunk more than he had eaten; after his father's death he came under his uncle's protection; he was set to work at digging and trenching; at the end of ten days, having received his wages, he went "on a spree" and did not return till morning, still drunk and covered with mud. He was arrested at Boulogne as a vagrant, and sent to St. Anne's; dishonest, gross, gluttonous. Father died, æt. 59, of chronic bronchitis; always used strong drinks to excess, generally wine, sometimes brandy; he was already a drunkard when he married, at 27 years. Paternal grandfather died of pneumonia at 65

years; occasional excesses in drink. A brother, deformed, died at 3 weeks. Another brother died at 29 years of lung disease; excessive drinker; had convulsive symptoms before death. Another brother died at 18 years with convulsions, athrepsia. Sister died at 5 months with convulsions. Nothing on the mother's side.

From his birth the child is already affected with nervous disease; he is slightly hydrocephalic. Son, grandson, and brother of alcoholists, nervous in his organization, tainted with epilepsy of rapid development, he is pre-eminently predisposed to become an alcoholist; and, as a matter of fact, his hereditary predisposition does manifest itself as early as 6 years. Let us note also the unfavorable influence of the education he receives; he is left to himself without supervision by his father; led astray by his brother, associating with the outcasts of the streets. Is not this the type of the education and existence of the children of drunkards, such as we have endeavored to trace above?

To the organic causes already discussed we must add others which, although entirely mental, act none the less in an analogous manner. Grief, sorrow, disappointment in particular, are frequently the cause of alcoholism. It is said So-and-So is a ruined man, or has had some severe trials, and has taken to drink to drown his sorrow. In the following case it is after a failure in business that the man takes to strong drink. We take this fact as prima facie evidence that our subject was an alcoholismic by heredity. Let us see if the entire record will justify our conclusion.

Case LXXXVI. (unedited). — Legr., Étienne, age 16 years; epilepsy, pederasty. Father died, æt. 48, of asthma; he sometimes spat up blood; he was very stout; dealer in grain, wholesale grocer; failed in business and became reduced to poverty. He had been sober; after this occurrence he immediately commenced to drink absinthe in large doses, but "without getting drunk"; his mind was too much affected by his losses. Paternal grandfather died of pain in the heart; he was addicted to great excesses of strong drink. Grandmother died at 80 years of old age, after having been partially paralyzed; she had been weak-minded.

In all such cases we deal with men of weak character, of exaggerated nervous susceptibility; and very often it is a misfortune, practically very remediable, which prostrates them and drives them to trying to benumb their grief, to drown their sorrow, instead of endeavoring to react against their bad luck, and struggle on with all remaining energy to combat their failing fortune. We shall conclude with a rapid sketch of the rationale by which a transient habit may become so firmly fixed as to create an absolute necessity. In a normally-constituted individual, a habit of even considerable duration may be broken with tolerable facility, and suppressed entirely, without producing any great inconvenience. In an individual of neuropathic diathesis, on the contrary, it does cause inconvenience, and even pain sometimes, to eradicate an acquired habit, and often even the attempts fail; this is the experience of alcoholismics by heredity. Special circumstances may oblige two men to resort to alcohol as an adjuvant to their daily sustenance, as occurred in many cases during the siege of Paris, or for any other reason, and this usage may have to be continued for some time. Now, after the necessity shall have passed away, what will happen? Two individuals, one of whom is normally constituted, mentally well balanced, will readily return to his former mode of life, and at one stroke lop off his acquired habits or conquer them with but a slight effort. The other, on the contrary, tainted by heredity with alcoholism or neuropathy, will find himself unequal to the requisite effort; his habit has grown to be a necessity, and the longer it lasts the more imperious and irresistible it will become. Furthermore, the dose that has sufficed will do so no longer; the organism has become accustomed to it; the sensitiveness to it is blunted. The patient augments first the quantity, and, later on, the inherent strength of his libations. He has drunk wine, now he drinks brandy; soon it will be absinthe; and after that he will invent some potation, stronger still, if possible, as did the man whom we record in the following instance.

CASE LXXXVII. (unedited). — Wildm., Charles, age 20 years; hysteria. Nothing on the father's side. Mother, nothing noteworthy. Maternal aunt very impressionable; died of grief at seeing her mother die suddenly. Two maternal

uncles habitual drunkards. Maternal grandfather died from the effects of an attempt to strangle himself; he was always drunk; he had always drunk to excess; he married at 20 years; on his wedding day he was so drunk that he had to be carried to church; his disposition was wicked and violent; he commenced by drinking wine; when this palled on his appetite he took to brandy, and when this lost its piquancy he strengthened it with pepper. Six brothers or sisters of patient were affected with hydrocephalus. Two sisters and one brother subject to chronic cephalalgia.

Any circumstance, otherwise most trivial, that leads the hereditary alcoholismic to use strong drink, occasionally at first, later habitually, will lead him almost certainly to alcoholism. Among workingmen, the circumstance that most frequently gives opportunity for the acquirement of the habit is prolonged idleness, which may be involuntary by "lock-out," by scarcity of work, or by physical inability during sickness or by accident; or, on the other hand, it may be self-imposed, by a "strike," which forbids him to work, while his mode of life is not modified. We shall not trace here the phases through which the workman, thus circumstanced, passes in his onward march to most complete alcoholism. This progression concerns rather the sociologist than the physician. A writer, who has taken upon himself the task of elucidating the effects of heredity in the social life of to-day, has struck off this life sketch with a master hand—it is the portraiture of "Coupeau," in "l'Assommoir" by Emile Zola.

Conclusions.

We shall be very brief in recapitulating our conclusions from this necessarily long treatise: they have been emphasized, as occasions occurred, during our argument. We may deduce several general facts, which we sum up as follows:

1. Between dipsomania, hereditary insanity, on the one hand, and alcoholism, called "acquired," on the other hand, there exists an intermediate form of the propensity for alcoholic drink; this intermediate form is alcoholism by heredity; it is certainly more frequent than dipsomania, and tends more and more to encroach upon the domain of "acquired" alcoholism;

i.e., alcoholism by heredity may be found to have pre-existed in cases heretofore interpreted as simply acquired alcoholism.

2. The heredity of alcoholism may be either by similars or by dissimilars. The relative frequency of these forms is as three to four.

3. Alcoholism by heredity belongs to the neuropathic family, and more specifically to its psychopathic branch.

4. The causes which produce the outbreak of alcoholism in subjects having the hereditary taint, and more particularly in the progeny of subjects who themselves have alcoholism, are merely accidental or apparent, and are far from having the influence which has been attributed to them. The only true cause is the heredity, which creates the predisposition, the impulse, and a condition of intellect and feeling in the subject which render him incapable of resistance.

RABIES.

BY

LOUIS PASTEUR, PARIS.

RABIES.

INTRODUCTORY NOTE.

I TAKE pleasure in accepting an invitation to write a short introduction to M. Pasteur's article upon rabies. It is an article of absorbing interest, and one of especial importance to American readers for the reason that there still prevails here a considerable scepticism as to the value of the preventive method.

A perusal of M. Pasteur's lucid description of his work will help much to dissipate these doubts.

But, aside from this, there should, I believe, no longer be any hesitation in accepting as demonstrated the validity of the method devised and perfected by Pasteur.

The evidence that the lower animals can be perfectly protected from rabies by proper inoculations is considered absolute by Pasteur. The experiments of others are not altogether so satisfactory, but they show that some immunity is unquestionably conferred, and in general confirm the truth of the principle.

It may be yet asserted that its application to man is imperfectly developed, and that it still remains to be shown that anti-rabic inoculations should be widely adopted. As to this, a difference of opinion is allowable.

The establishment of Pasteur Institutes undoubtedly awakens a hydrophobia "scare" throughout the country and brings to light a great many cases of harmless bites by healthy dogs. It may be said, on the other hand, that this feeling of alarm is only the natural attendant of a novel measure, and that it will in time die away. The Institutes will then find and fill their legitimate place.

The introduction of Pasteur Institutes ought not, in any event, to prevent the adoption in every State of proper laws for the suppression of rabies. Many have great confidence in the muzzling and registration of dogs as measures for ridding the community of rabies and they cite the example of Germany where at present this disease hardly exists. Muzzling, however, has not been so effective in England; and in this country, it would be very difficult to enforce rigid dog-laws except in the cities.

Rabies is not very rare in the United States. I have not the recent mortality reports of New York City relating to hydrophobia, but for the twenty years, 1854 to 1874, there were from 1 to 7 deaths from this disease; or relatively about the same number as are now occurring in Paris.

Rabies prevailed extensively in this country one hundred years ago, and was very prevalent during the first thirty years of the present century. In the year 1870, according to the admittedly very imperfect data of United States census, there were 63 deaths from hydrophobia. This would indicate that during the year in question nearly four hundred persons were bitten by rabid dogs.

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Rabies is a disease which has been known from the earliest times. The dog may give it to man and to domestic animals. Animals, again, may communicate it to each other. At the time of writing this paper rabies is raging in England in a herd of deer in the park of the Marquis of Bristol, at Ickworth. The herd was composed of five hundred animals, and two hundred of them have already died, while the disease still rages. A rabid dog found his way into the park during the month of April last, and bit several animals, which died of rabies, but only after they had bitten a large number of their companions. (This information has been given me by Mr. Adams, demonstrator of pathology at Cambridge University, who is now being inoculated at the Pasteur Institute. This young and very distinguished scientist cut himself with a knife soiled with nervous matter, while performing a post-mortem examination on one of these rabid animals.)

A short time ago our knowledge of this disease was still

surrounded by many popular fallacies. Old writings, recent papers even, state that rabies may originate spontaneously, and the occasional causes producing the disease are likewise described. In the streets of certain towns one may see along the walls, in the summer time, small tin vessels filled with water in order that dogs may satisfy their thirst. Many think that unless such precautions are taken some animals must become rabid. Nevertheless, it is a fact that, in whatever physiological or pathological conditions a dog or any other animal is placed, rabies never makes its appearance in that animal unless it has been bitten or licked by another suffering from rabies at the time the wound was inflicted. Every person who is of opinion that rabies may originate spontaneously—an opinion I am even now fighting against—will at once answer: "But there must have been, at some time or other, one first animal spontaneously afflicted with rabies." That answer simply opens up the whole question of the origin of things, a question which is altogether outside the domain of scientific investigation. Whence came the first man? Whence came the first oak tree? Nobody knows, and it is useless to discuss such mysteries. Observation alone shows us that rabies never originates spontaneously. Nobody has ever proved the existence of spontaneous rabies, though many have attributed to it the symptoms of epilepsy, a disease frequently met with in the canine species. Further, it never breaks out in any country unless when introduced there by an animal bitten in another place where rabies is endemic. Many islands in the Pacific Ocean are quite free from it. It is not met with in the wide Australian continent, Norway, or Lapland. And yet these countries will be free of it only so long as they take proper measures to prevent the introduction of dogs which, after being bitten in another country, carry the virus with them in a latent form.

Moreover, it is not difficult to prove that rabies is a disease which cannot appear *de novo* under any physiological conditions, and that its spontaneous origin is quite impossible. We know nowadays that contagious or virulent affections are caused by small microscopic beings which are called microbes. The anthrax of cattle, malignant pustule of man, is produced by a microbe; croup is produced by a microbe. . . . The microbe of rabies has not been isolated as yet, but, judging by

analogy, we must believe in its existence. To resume: every virus is a microbe.

Although these beings are of infinite smallness, the conditions of their life and propagation are subject to the same general laws which regulate the birth and multiplication of the higher animal and vegetable beings. They, like the latter, never have a spontaneous origin; like the latter, they are derived from beings similar to themselves. It has been proved, without the shadow of a doubt, that, in the present state of science, the belief in spontaneous generation is a chimera. If it be said that life must have appeared on this earth spontaneously at some period or other, I must repeat the statement which I made just now, namely, that the origin of all things on earth is hidden behind an impenetrable veil. In short, rabies is not a spontaneous disease.

As it is always due to the direct inoculation of its virus by a rabid animal, it is easy to understand that simple police measures will suffice to stamp out this horrible disease, more especially in insular countries like England or Ireland. Two or three years would perhaps be enough to eradicate it, if owners were compelled to muzzle their dogs or to lead them by a string when in the streets. The destruction of all wolves in the United Kingdom was a far more difficult task, and yet it was successfully accomplished.

Everybody, medical men especially, agree in thinking that rabies, in man at least, is an incurable disease. If a man be bitten by a rabid animal in such a manner that he must necessarily die of rabies, his health may nevertheless remain perfectly good for several weeks, though the treacherous virus creeps on in his body, carried by the blood or finding its way along the nerves, until it invades the nervous centres. It is always first found in the latter, and thence passes into the salivary glands. The first symptoms now make their appearance: fear of water and of all liquids, intense headache, spasms of the throat, dilated pupils, haggard eyes, severe pain or mere itching at the seat of the bite. In rare cases the patient tries to bite; if so, he bites the bed clothes, but the people near him only in rare cases. He expectorates frequently, while convulsive movements follow on the slightest breath or draught of air. He is afraid of shining objects, and the slightest noise causes him to start. . . . These are some of the striking signs

of the disease. If one or several of these morbid symptoms make their appearance, rabies is present, and, whatever may be done, runs its own independent and fatal course. Death, sometimes preceded by horrible sufferings and indescribable maniacal attacks of fury, shortly follows.

Strange to say, this disease, on which the resources of medicine have no effect, has been treated in all countries by an endless number of remedies, all supposed to be infallible. There is no country in Europe or America, be it small or large, in which persons are not to be found who are supposed to be able to cure rabies, or in which practices which are said to prevent the occurrence of the disease may not be studied. The erroneous belief on which such practices are based is due to the fact that it is difficult for men in general to apply to their knowledge of facts, more or less mysterious in their nature, and the causation of which is unexplained, the precepts derived from experimental methods. The human mind is always struck by anything which appears to be marvellous. A man, for instance, will often believe the quack who tells him that a stone of a certain kind, or a plant, will prevent the evil effects of a bite from a rabid animal, provided this stone or plant be merely placed in contact with the wound. He may say even that he has personally experienced the good effects of such a practice, if rabies has not followed the application of the remedy to one patient. He forgets that to draw such a conclusion must necessarily be a mistake, simply because every bite from a rabid animal is not always followed by the breaking out of the disease in the person so bitten. Now, suppose a hundred people to have been bitten by rabid dogs, how many will die of this terrible disease? It is difficult to answer such a question. Moreover, the number of victims varies for several reasons. Nevertheless, it is generally supposed that if the deaths taking place among a large number of persons bitten by rabid animals be added up, and if their seat and gravity be not taken into account, the mortality among persons bitten amounts to 15 or 20 per cent. In other words, more than eighty out of a hundred persons suffer no evil effects from the bite. It is easy, therefore, to be deceived as to the value of any preventive remedy. For, if we apply it to a small number of persons, it will seem to have been successful in four cases out of five. Is that not more than sufficient to

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BY

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may then, when inoculated into animals, enable them to resist the action of the primitive fatal virus. In other words, one may produce in a dog a state in which it is impossible for that animal to contract rabies. Take a dozen dogs, vaccinate them in the manner which I have just mentioned, and then inoculate them at the surface of the brain with the pure virus of rabies. Then perform the latter operation, at the same time, on twelve other non-vaccinated animals. Not one of the first dozen will contract the disease, but the twelve other animals will all die of it after exhibiting all the various symptoms typical of rabies, resembling in every particular those produced by the bite of a rabid animal wandering about the streets. The experiments which I have just mentioned, showing that dogs may be vaccinated against rabies, may be successfully repeated on other dogs even if they have been bitten by rabid animals before the inoculations are begun, provided too long a period has not elapsed between the time of the bite and that of the protective inoculations. The success of such a course of treatment depends on the usually long period of time intervening between the day of the bite and the period at which the first symptoms of rabies show themselves. The immunity due to vaccination is produced in animals before the period at which the acute symptoms of rabies ought to appear. This is indirectly but fully proved by the fact that, if the period of incubation in a dog be much shortened, our method may not prove successful in vaccinating that animal. If the virus be, for instance, inoculated at the surface of the brain, the disease often follows as early as two weeks after the inoculation. It is noticeable that, in order to protect an animal efficiently under these conditions, the whole process of preventive inoculations must be carried on as quickly as possible, if that animal is to be efficiently vaccinated before the fatal symptoms of rabies appear.

It is necessary to demonstrate by experiments that an animal may acquire immunity against rabies if it be submitted to the prophylactic treatment of which we have spoken here. Of course, all experiments demonstrating this fact must be made on animals only, and all trials on men must not only be forbidden, but, moreover, must be considered as criminal. Nevertheless, we are justified in thinking that results obtained on animals may, for the most part at least, be

obtained in man also. Now it is easy to prove that a dog previously vaccinated, and so rendered incapable of contracting rabies, may be inoculated under the skin with almost any quantity of the purest and strongest virus, without this inoculation being followed by any evil consequences. Vaccinated dogs have been inoculated on different occasions with several cubic centimetres of virus taken from the medulla oblongata of dogs dead of rabies, without noticeable evil effects, although such inoculations were effected not only once but every day during several months. Vaccinated dogs during the year succeeding this operation are not injuriously affected by the bites of rabid animals.

Some years ago I brought together at Villeneuve l'Etang many dogs vaccinated during the year 1884, and placed them in a large kennel. After having demonstrated the fact that in 1885 and 1886 the larger number of these animals, though not all (eleven out of fourteen in 1885, four out of six in 1886), had not suffered any harm from the inoculation of the *rage des rues* (street rabies) even when the virus was deposited on the surface of the brain, I came to the conclusion that, after all, it was only necessary to know whether such vaccinated animals would be able to resist the action of the virus when introduced by a bite. Accordingly, in 1887, 1888, and 1889, vaccinated animals were merely bitten by dogs suffering from rabies, and not inoculated under the skull. In 1887 the vaccinated dogs suffered no evil effects after being inoculated by the bite of a rabid dog. In the month of July, 1888, five dogs vaccinated in the year 1884 were bitten, together with five non-vaccinated animals. The five vaccinated animals are now (August, 1889) still in perfect health, whereas, of the five others, three died of rabies and two are living now. At the time of writing a similar experiment is in progress on another group of animals vaccinated in 1884. If these animals resist, and if all or some of the non-vaccinated animals die of rabies, it will be a positive proof that the artificial immunity against fresh bites from rabid animals may extend over a period exceeding five years. However great the advances made in our knowledge of the etiology and prophylaxis of rabies among animals may have been, these results were interesting chiefly because they justified us more and more in hoping that the preventive methods against rabies might be successful in the

case of men bitten by rabid animals. But the question was how to summon up courage enough to make that trial and to overstep the frontier which separates man from animals. If it be true that the Goddess of Chance helps men who are determined to find out the truth, we are certainly justified in thinking that she did so under the circumstances which I am about to relate.

The following account is from the pen of one who, in his official position, was present though all the phases of a period full of anguish and dreadful perplexities:

"On July 4th, 1885, at eight o'clock in the morning, Joseph Meister, nine years of age, the eldest son of a baker living at Steige (Alsace), was going alone from that village to a neighboring school at Meissengott. He was walking along an isolated path, a schoolboy's path, when a dog rushed at him and forced him to the ground. The child did not try to offer any resistance, but covered his face with his arms. The dog bit him, rolled him over and over, and worried him. A mason saw the scene from some distance off, and hurried to the spot. Armed with an iron bar, he beat the dog over and over again until the animal ran away home only to attack its owner. The owner, Théodore Vone, a grocer at Meissengott, took a gun and killed the dog. Foaming at the mouth, straw and pieces of wood in the stomach were there to show that the animal was presumably rabid.

"The parents of little Meister thought at first that their son had been attacked by a vicious dog. The day was spent in washing and dressing the child's wounds. But in the evening, frightened at what she heard—the accident the owner of the dog met with, the sudden determination of the owner to kill the dog with a shot from his gun—the mother took her little boy Joseph to Dr. Weber, at Villé. Dr. Weber cauterized the wounds with carbolic acid, although twelve hours had elapsed since the accident, and advised Madame Meister to start for Paris and to take the child to one who alone, owing to the severity of the case, would be capable of giving good advice. 'That man lives in the Rue d'Ulm,' added the physician, 'and he is called M. Pasteur.'

"M. Théodore Vone wished to accompany the mother, for she was getting more and more anxious, and the child's legs and thighs were so severely wounded that he could scarcely

walk. They came to the laboratory on Monday, July 6th. M. Pasteur was greatly distressed and affected by the misfortunes of these poor people, and, although fully convinced of the value of his last experiments, the idea of applying his method for the first time on that child caused him great anguish. He therefore went and told Dr. Vulpian, and his pupil and friend, Dr. Grancher, professor at the Faculty of Medicine, of the situation he found himself face to face with. Dr. Vulpian and Dr. Grancher came at once, and saw little Meister, and, both of them agreeing, advised M. Pasteur to try on the child, doomed to an almost certain death, the method which had always been successful when applied to dogs.

"A shepherd from the Jura, named Jean Baptiste Jupille, came after little Meister. This boy had been bitten by a rabid dog, and arrived in order to undergo the preventive inoculations, after six days had already elapsed since he had been injured. M. Pasteur felt rather anxious on account of this delay of six days. But, although he carefully noted the difference between that space of time and the two days and a half which had elapsed from the time little Meister had been bitten to the beginning of the inoculations, he hoped that it was still possible to act. As rabies but rarely breaks out in man before a period of less than one month or six weeks after the bite, it appeared possible that the inoculations might have time to fully exert their vaccinating influence, and prevent the effects of the virus of rabies. It is really a question of speed. Rabies is, owing to the relative length of its period of incubation, like a Parliamentary train, whereas the vaccine, on account of the large amount which is injected, passes it just as an express train passes a slow train, and, after it has once passed it, prevents the active virus from entering the human economy. All Paris followed with the greatest interest that second experiment on Jupille. In the Press, in drawing-rooms, in cafés, in the streets even, everybody gave his opinion, sometimes enthusiastic, sometimes reserved, sometimes hostile or even abusive, as to the degree of confidence which the newly-announced method deserved. A sentimental reason further increased the interest the crowd took in that experiment. That shepherd had given proofs of real courage.

"He was watching his flock in a meadow at Villers-Farlay

in the Jura, when he saw a rabid dog running toward a group of children who were playing some little distance off. Jupille ran, whip in hand, to meet the dog. The children were able to run away, while the dog attacked Jupille. Then began a terrible struggle. With the help of his right hand Jupille freed his left hand, which was held fast by the teeth of the dog. Mastering the animal, he succeeded in tying up its mouth with the cord of his whip, and seizing one of his wooden shoes he brained the brute. . . .

"The French Academy rewarded his plucky action with a prize of 1,000 fr. This sum brought a little comfort to the very poor family of Jupille, who, luckily for him, very soon saw the grandeur of his reputation in a true light. Like La Fontaine's shepherd, who had been raised for one moment to the dignity of favorite, he left Paris,

'Comme l'on sortirait d'un songe,'

and went quietly back to Villers-Farlay. (Meister and Jupille are alive to this day and in perfect health.—Translator.)

"Then bitten persons arrived from all quarters. Nobody could have believed that such a large number of accidents could be due to rabies.

"It was at this time, in the midst of this crowd of people coming to be inoculated, that, on November 9th, 1885, a child ten years old, little Louise Pelletier, came to M. Pasteur, after having been bitten thirty-seven days before. A huge mountain dog had furiously attacked her at La Varenne Saint-Hilaire. Not only was there a wound in the armpit, but there was another deep one at the back of the head. . . . The case seemed hopeless. But had there been only one chance in a thousand of saving this child, it would still have been right to make a trial and apply the method. . . . The treatment had come to an end a few days before, and the child had returned to the lodgings of her parents in the Rue Dauphine, had gone back to the life of a hard-working schoolgirl, and one might almost have begun to hope she was safe, when the first symptoms of hydrophobia made their appearance. The child refused all fluids. The contractions of the throat allowed no liquids to pass. The spasms of suffocation choked her speech. One might have fancied one heard the last sobs which follow in the wake of a child's fits of anger.

"On the morning of December 2d a period of calm came, which lasted eight hours. A struggle seemed to take place between the disease and the preventive inoculation, which had been begun again and were repeated every two hours. But the virus had already extended too far. Rabies was too powerful. In the evening the disease, attended by its horrors, hiccoughs, and hallucinations, made further progress. The unfortunate little one said she felt as if water was running all over her body. At times she did not recognize her father, taking him for a stranger; then, noticing her mistake suddenly, she showered upon him her excuses and caresses. She kept calling for M. Pasteur and took his hands, saying: 'Stay near my bed; I should be afraid if you went away! Oh! I am so glad to have you near me.' The words came by fits and starts from her panting throat; death was creeping over her eyes—the great black eyes which anxiously watched us—and during these awful hours the sister, who had been removed from the room, went on with her school lessons in the dining-room, by the light of a lamp.

"On December 3d little Louise Pelletier died. There was at first a rebound in public opinion. From all parts of the horizon certain journalists, birds of evil omen, came flying to the spot. Articles were flaunted about bearing as title, 'Le Triomphe de M. Pasteur.' Not only did they proclaim that the method was a failure, but they even insinuated that the death of little Louise Pelletier was due not to the bites of the dog, but to the virus contained in the fluid used for inoculations. M. Pasteur was worse than a charlatan; he was a murderer. The calumnies became more and more virulent. Did they succeed in preventing people from coming to the laboratory? They caused some to hesitate, at any rate. A Hungarian woman, bitten by a rabid dog, came immediately to Paris to be inoculated by M. Pasteur, but stayed there six days before she summoned up courage enough to knock at the laboratory door. When M. Pasteur asked her the cause of this delay, she answered in return: 'After I had read all I was made to read, I had no longer any confidence.' At the very moment when the departure from New York of four American children bitten by a rabid dog was announced, these philanthropic papers stated publicly that if the sad ending of little Louise Pelletier had been known in America the parents

would have spared the children a long and certainly useless journey. They came and went back cured, and hundreds of bitten people followed them. . . .

"In the month of March, 1886, nineteen Russian peasants, clothed in the skins of animals, came all the way from the neighborhood of Smolensk, after having been bitten by a rabid wolf. The wolf, roaming through the country for two days and two nights, had attacked these peasants with such fury that some were actually disfigured, while others were lacerated and bruised. This batch of Russians caused great anxiety, because, whereas in the case of dog-bites one person out of six dies, the percentage of deaths after bites from rabid wolves is very much higher. The virus is the same, but in most cases the dog after biting passes on, whereas the wolf worrying its victim favors the introduction of virus. Often of twenty people bitten by a rabid wolf every single one dies. . . . Of the nineteen Russians from Smolensk, sixteen went home cured. . . .

"The three Russians who died had horrible wounds on the head. Perhaps there might have been some chance of curing them if the preventive inoculations had been begun at once. But how could it be possible, after fourteen days had elapsed, to find a remedy when the whole body had already been permeated by the virus? At the post-mortem examination of one of these unhappy people, a broken tooth of the wolf was found sticking in the skull. When, on the eve of their departure, the sixteen others, after being cured, crossed the door of the laboratory for the last time, they felt a religious veneration, just as if they had been crossing the door of the Kremlin."

These sixteen Russians are in excellent health still. It is not difficult to explain the causes of the failure of the treatment, when applied under the circumstances attending the deaths of Louise Pelletier and of the three Russians of whom we have just spoken. We have but to think over the facts which we mentioned just now, while writing of the intra-cranial injections of pure virus, which are always followed by a fatal attack of rabies. The virus of rabies in the latter mode of procedure is placed in direct contact with the brain substance, and begins to develop at once. The symptoms of rabies, nevertheless, even under these conditions, show themselves only after a fortnight has elapsed. We may suppose that if,

in the case of Louise Pelletier, the virus of rabies had already begun to increase at the time she was brought by her mother to undergo the treatment, the preventive inoculations did not have time to exert their beneficent action on her nervous system, brain, or medulla oblongata. According to this hypothesis the case was hopeless from the first. It must often happen that, in the case of some of our patients bitten in a similar manner—especially if the wounds be on the face, or, still worse, on the head—the virus of rabies is carried to the nervous centres in a very few days, or even hours after the bite, and acts under these conditions as if it had been introduced directly under the skull after trephining.

At the very time of writing these lines, I received notes relating to a large number of cases of death from rabies, which took place in 1877. The deaths followed the bites so quickly that, a small number excepted, all belong to the category of cases of which I have just spoken. Although the story is a long and painful one, the readers will allow me to relate it in the very words of Dr. Baley, a medical practitioner at Châteaulieu, in the department of Finistère, who kindly gave me the particulars. All the facts are very instructive, and the circumstances have never been fully published in any paper.

During the early days of the month of November, 1877, a setter dog of medium size passed near the powder manufactory of Pont-de-Buis and attacked two dogs belonging to the director of the manufactory. The dog went on and presently came to a place called Port-Launay, meeting five dogs, which he bit one after the other, but which were at once destroyed, as the dog that bit them appeared to be strange in his manner. The same dog continued his progress and bit two watch-dogs, two oxen, and two pigs. Then, retracing his steps, he again paused at Pont-de-Buis, but was killed by the director, who recognized him.

The director of the powder manufactory closely observed his two dogs, and both died of rabies a fortnight afterward, at one day's interval from each other. The veterinary surgeon of Châteaulieu (Finistère) and I were able to recognize the disease ourselves. A few days afterward one of the farm dogs belonging to M. Auffert, who had been bitten in the

higher part of the village, appeared to be strange in its manner and was at once destroyed. Unfortunately, the two sons of M. Auffert, six and seven years of age, were bitten by their father's dog and died of rabies about a fortnight after.

The other farm dog belonging to an individual called Piriou de Pratyr, was tied up, but on December 1st broke the chain and, roaming round Châteaulieu, was stopped by a workman named Poulmarch, aged 43 years, who was bitten in the hand and died of rabies on December 13th. The dog was locked up in the market-house, but not being closely watched escaped, and completely disappeared, and no one was able to find out what became of it.

On November 23d of the same year, a she-wolf started from Kernesal Wood, which is situated six kilomètres from Châteaulieu, and in her progress bit men and animals with great fury. She was killed ultimately sixteen kilomètres from her starting point at the Menez-Horn, just as she was biting the young dog of a peasant. This man, seeing the extreme state of fatigue and collapse of the wolf, was able to put her out of her misery by braining her with a club.

During her progress, the she-wolf bit thirty-seven animals (horses, cows, oxen) which were closely watched until every single one of them had died of rabies.

The following are the names and ages of the persons bitten by this animal, as well as the description of their wounds:

1. A woman, aged 60, bitten in the shoulder and hand, was not cauterized. She is still alive.

2. Cardion, Pierre, aged 13, bitten in the hand and arm, was cauterized, but died on December 9th.

3. Allain, Pierre, aged 5½, was horribly mutilated, and died the next day from the effects of his wounds.

4. Monjour, Jeanne, aged 10, bitten on the head and hands, died on December 11th of rabies, although she had been cauterized.

5. Monjour, Yves, aged 9, bitten on the face and hand, had been cauterized, but died of rabies on December 13th.

6. Monjour, Guillaume, aged 8, bitten on the face and hand, had been cauterized, but died of rabies on December 14th.

(The last four patients were watching their flocks and were

bitten together, the wolf only leaving one in order to attack another. They were cauterized with a red-hot iron a few hours after the accident.)

7. M. Le Roy, aged 22, several wounds on hand, arm, and face. He actually wrestled with the brute. He was cauterized and is alive now.

8. Mlle. Avant, 20 years, was slightly bitten on the shoulder through thick clothes. She was not cauterized, and died of rabies on January 30th, 1878.

9. A man about 30 years old was horribly bitten in the head, and sent to the hospital at Brest, in order to have his wounds attended to. He was alive one year afterward, but I have lost sight of him since.

10. Le Borgne, aged 14, tried to escape from the wolf by climbing up a tree, but was bitten in the foot and died fifteen days afterward.

11. Mionca, aged 13, and another child of the same age were not badly bitten, but were not cauterized. Mionca died of rabies fourteen days afterward, while the other one is alive still.

Four other peasants, who met the beast during her progress, were bitten. I do not know what became of them afterward, being unable to trace them, but I am sure that they did not die of rabies, at least not during the same period as the other victims.

In the majority of these cases vaccination by preventive inoculations could only have been applied too late, and could not therefore have increased the resisting powers of the nervous centres. It but seldom happens, however, that persons are bitten under circumstances like those I have just related; and, in desperate cases even, it would be unfair to refuse to give the preventive treatment a trial, and wrong to give up all hope of a cure, for the cases which have been cured after bites on the head and face are extremely numerous.

This is the proper time to answer a question which is often asked by patients or their friends, namely, whether it is expedient to have recourse to the preventive treatment when the patient has been bitten some time before? There is only one possible answer to such a question: It is never too late to begin the treatment, as, if not treated, the odds are all against

the patient. On the other hand it is quite evident that the chances of the treatment being successful increase largely if the bites be of very recent date. The danger, if a long time elapses between the date of the bite and the time at which the treatment is begun, consists in the fact that rabies may suddenly appear during the process of treatment. If, on the other hand, it does not show itself within a fortnight after the treatment is finished, the inoculations will have as much effect as if they had been made soon after the bite.

A short time ago, Madame Luisa Carrera came all the way from Spain to our anti-rabic Institute, and has been undergoing the preventive treatment. She had been bitten, nearly one year before, on September 15th, 1888, by a dog. That animal had also bitten, on the same day, a young man, who died of rabies at the end of July, 1889, after ten and a half months had elapsed from the time of the bite. Madame Carrera became frightened, and hurried to the Pasteur Institute. A few weeks have now passed since the last inoculations were made on her. The latter will, no doubt, prove just as efficacious as if she had undergone the process immediately after being bitten in 1888.

It would be rash to conclude, from these or other facts which I mention, that the treatment may be put off *ad infinitum.* The contrary, namely, that it is better to make haste, is the truth. Physiologically speaking, in all severe cases—and remember that it is difficult to judge *à priori* of the severity of a case—the object ought to be to begin treatment soon enough for the latter to be concluded before the virus has begun to develop itself in the nervous centres.

If we take one hundred cases of persons bitten by dogs proved to be rabid, the mortality among these persons after they have been subjected to preventive inoculations does not amount to 1 per cent. The mortality does not exceed 2 to 4 per cent if people bitten on the head and face are alone taken into account. Now, all the competent men who have written on rabies allow that the mortality before the preventive system was discovered amounted, in the case of face bites, to no less than 65 to 95 per cent, whereas if all bites, wherever their seat may have been, be counted, the mortality amounted to 15 or 16 per cent at least. I believe this number to be far too low, but, nevertheless, I have gladly accepted it, in order to

fix people's ideas, and also because, by allowing that it was correct, I could not be suspected of overrating the value of my mode of treatment.

When the prophylactic method for rabies was first applied to patients who had been bitten, when, for instance, Louise Pelletier died, it was easy to contradict, and criticism was often specious. We, at that time, applied the method to a certain number of patients, and rabies did not break out in any of them. Men who, whatever happened, were determined to contradict, simply argued that rabies, even if no treatment had been applied, would perhaps never have broken out in such patients; while, if the treatment proved unsuccessful, they argued that rabies was bound to break out, and even went so far as to say that the death of these patients was due to the method of treatment.

Things are much changed to-day. The change is due to the fact that truth, in order to be recognized, need only stand the test of time. In various parts of the globe anti-rabic laboratories have been built in imitation of the Paris Institute. The results obtained in these places are as good as ours, better even; and, as an instance, I may mention that Dr. Bujwid has lately published an account of 370 patients vaccinated by him without one death. Italy has now six anti-rabic laboratories—Turin, Milan, Bologna, Rome, Naples, and Palermo. Russia has seven institutes—St. Petersburg, Moscow, Warsaw, Odessa, Kharkoff, Samara, and Tiflis. There is also one at Constantinople, at Havana, at Mexico, at Rio de Janeiro, at Barcelona, at Bucharest, at Vienna, at Buenos Ayres, and another is now being started in Bolivia.

Did I wish to recall cases likely to strike the minds of the most prejudiced people—of those who, for instance, systematically refuse to believe in any vaccination whatsoever—I might quote any number of remarkable proofs of the efficacy of this method. During the last four years the average number of people who come to the Pasteur Institute in order to undergo the preventive treatment (after having been bitten by rabid dogs) amounts to 150 per month. It would be easy to pick out a few demonstrative cases among the seven or eight thousand people who have already been inoculated at the Pasteur Institute.

But each of the anti-rabic institutes could show a number

of similar cases, all proving the efficacy of this method, and I will only mention a single fact which may be even more striking than any of these could be. Dr. Dujardin-Beaumetz, at the request of the prefect of police, made careful inquiries as to the number of persons bitten in the Department of the Seine during the year 1887. In his official report, printed in 1888, he states that 306 of the people so bitten were vaccinated at the Pasteur Institute, and that three of them died of rabies, whereas of the forty-four persons who were not inoculated seven died of rabies. The mortality in the first case is 0.97 per cent, and 15.90 per cent in the second.

In short, the method of prophylaxis against rabies has been proved to be efficacious, and every day, as the number of persons so inoculated increases, brings further proofs of that fact.

Two manifestations, both in England, have greatly helped in removing whatever want of confidence in the prophylactic method against rabies may have existed.

The first manifestation consisted in the publication of the report drawn up, after careful and prolonged experimental trials lasting nearly one year, by a commission appointed in 1886 by the House of Commons, on the proposition of Sir Henry Roscoe. This commission was composed of the most expert scientists of Great Britain, namely, Sir James Paget, Bart., President; Dr. Lauder Brunton; Dr. G. Fleming, President of the Veterinary College; Sir Joseph Lister, Bart.; Dr. Richard Quain; Sir Henry Roscoe; Professor Burdon Sanderson, and Professor Victor Horsley, Secretary.

The conclusion of the report was that M. Pasteur had discovered a preventive method for rabies, similar to the method of vaccination against variola.

The second manifestation took place at the Mansion House, on July 1st, 1889, at a meeting called by the Lord Mayor, when resolutions were passed before a gathering of the most expert physicians and learned biologists of England, including, beside those named above, Sir John Lubbock, Professor Michael Foster, and Professor E. Ray Lankester.

Rabies is a far more common disease than is generally supposed, and I may be allowed to give one demonstrative proof of this fact.

From January 1st to July 1st, 1889, during a period of six months, therefore, England sent to the Institute fifty persons

bitten by rabid dogs, that is, six or seven each month on an average. At that time Englishmen so bitten paid their own travelling and hotel expenses in Paris. Since July 1st, a fund having been started by the Lord Mayor, according to the third resolution just mentioned, all Englishmen, however poor, bitten by rabid dogs, have been able to proceed to Paris. Accordingly, during the months of July and August, that is, in the months during which the cases of rabies are least numerous, thirty-nine English persons bitten by dogs proved to be rabid have been inoculated in the anti-rabic department of the Pasteur Institute. This large number of patients is not due to rabies having increased, but rather to the fact that the preventive treatment is now within reach of everybody in England.

In addition to the documents just mentioned, I must also call attention to the lecture delivered by Dr. Armand Ruffer at the meeting of the British Medical Association at Leeds, on August 16th, 1889. The lecturer, after giving a full account of the results gained by the anti-rabic method, concluded his lecture by stating that this treatment had already been the means of saving over one thousand human lives—a statement which was greeted with the unanimous applause of the large and learned audience.

COLOTOMY, LUMBAR AND ILIAC,

WITH SPECIAL REFERENCE TO

THE CHOICE OF OPERATION.

BY

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COLOTOMY, LUMBAR AND ILIAC,

WITH SPECIAL REFERENCE TO

THE CHOICE OF OPERATION.

THE subject to which I wish to draw your attention is that of colotomy, and I propose to consider it chiefly with reference to the form of operation which should be selected. It is not my intention to enter at any length into the history of the operation, for such would be wearisome; but I must remind you that while Littré in 1710 suggested, in the "Memoirs of the Academy of Sciences of Paris," the performance of the iliac (miscalled inguinal) or intra-peritoneal colotomy for the relief of infants born with imperforate bowel, the idea was not practically applied for eighty-seven years, when Pillore of Rouen in 1797 opened the cæcum in the right iliac fossa; and that while Callisen of Copenhagen proposed the extra-peritoneal operation of lumbar colotomy in 1796, it was not till 1839, when the operation was taken up and carried into effect by Amussat, that colotomy can in any sense be said to have found a place in the practice of surgery. The practical adoption of the operation was, however, very slow as far as London was concerned, for in October, 1859 (that is, twenty years after Amussat's success), or thirty years ago, when I undertook my first lumbar colotomy in a patient of the late Dr. Thomas Addison, the operation had been undertaken but once at Guy's Hospital, and that was by Mr. Hilton ten years previously;[1] and I am not aware that it had at that time been performed at any other hospital. Indeed, it may with all truth be said that the operation in both its varieties was then regarded with scant favor by the general body of the profession.

It may have been occasionally sanctioned as an operation for the relief of congenital rectal malformations when other measures had failed or were inapplicable; and to bring about this practice Mr. Curling's paper of 1860[2] had an undoubted influence; but as a means for giving relief to patients suffering from chronic intestinal organic ulceration or obstruction, from whatever cause, it was generally, and, indeed, I may say is still, too much regarded as a *dernier ressort*, and, as a consequence, it was as a rule only carried out when all other means had been tried and proved to be useless. This position of colotomy, I, in common with some few other surgeons, have, however, never accepted. We have held a more favorable view of its capabilities both as a life-saving as well as a reliable palliative measure. We have regarded it as the best means the surgeon has at his disposal for the relief of rectal obstruction from cancerous and other disease which is not otherwise removable; for experience has proved that life may by it be saved when the disease is not cancerous, and prolonged even for years when it is so. Experience has likewise taught us, where these good results are not to be expected, that what remains of life will be made more endurable; for the local disease which is the cause of the obstruction makes much slower progress and becomes a source of less distress as soon as the fæces are diverted from their normal course, and as an agent of irritation are removed. Within the last ten years there has consequently been a remarkable advance in the position of colotomy as an operation for the relief of rectal stricture, and at the present day the value of the operation is not only fully recognized by an increasing number of surgeons, but a warm discussion has arisen as to the operation which should be performed; indeed, the casual reader of the journals and periodicals might be led to think that the lumbar or extra-peritoneal measure, which has hitherto found most favor, was becoming obsolete and doomed to give way to the iliac or intra-peritoneal method. For at the present time—where in this branch of surgery, as in so many others, we see a measure of success follows modern practice, which by the old could never have been anticipated; when old landmarks are removed, and new ones are being laid down; it may appear to the skilful and ambitious as if "all things seem possible"; under such circumstances it behooves us, therefore, to

take stock of facts and see whither we are tending, in order that the old paths be not blotted out by new without a good reason, and that change should not be mistaken for improvement; for caution must still be the surgeon's motto, and venturesomeness his rock of offence.

I propose in the present paper, therefore, to compare the value of the lumbar or extra-peritoneal with the iliac or intra-peritoneal method of colotomy, and so utilize the experience I may have had of one or both operations, to help toward the solution of the important practical problem as it now presents itself.

I would premise, however, in order to make clearer what I shall have to notice later on, that I have for many years

always employed the oblique incision for lumbar colotomy (see engraving). For this line of incision not only follows the course of the nerves and vessels and allows room for all necessary manipulation, but falls naturally into the fold of skin above the crest of the ilium, which is constant in all, and well marked in fat, people. This fold, I have reason to believe, acts beneficially in preventing the prolapse of the bowel which surgeons who employ other lines of incision are said to complain of, and at the same time tends to keep the artificial anus closed. When the bowel is exposed, I separate it carefully with the fingers from its upper and posterior attachments, and so allow it to bulge well out of the wound. When it is not over-distended, I, with a finger gently introduced at its posterior border, hook it well out of the wound, and rotate it inward, in order to expose to view its posterior longitudinal

hand. I then and there fix it to the margins of the skin wound. Should the symptoms be urgent, I open the bowel at once, after having passed two sutures with a long straight needle through the integument and bowel, and giving them into the hands of an assistant to hold and to keep tight. I open the bowel between these sutures, and as the contents of the bowel escape keep a stream of iodine water flowing over the part. With an aneurism needle or finger inserted into the lumen of the opened bowel, I then draw the centre of one suture out, divide it, and with the divided suture fasten the opposite borders of the bowel to the skin wound, and deal with the second suture in a like way. A free opening is made into the bowel. The bowel is fixed subsequently with two or more sutures, and, as a rule, the inner border of the wound is left open for drainage purposes, particularly if the patient be very fat. When there is no need or urgency to open the bowel at the time of operation, I leave it *in situ* for three or more days. In some cases I stitch the projecting unopen bowel to the margin of the wound; in others I transfix it with long pins. The former practice seems preferable in fat subjects, where the wound is deep; the latter in thin subjects where the bowel can be well drawn out. I never fix the bowel to the muscle. In two or three cases in which I have transfixed the bowel with pins I have had some slight local inflammation and suppuration from the escape of fæcal air at one or other of the points of puncture; but this complication has never been the source of any serious detriment. The practice, indeed, is so simple and satisfactory that I do not regard this objection as one of any importance.

I do not propose to make much use of or to rely upon statistics in the question before us—for the value of an operation of colotomy is no more to be estimated by statistical results than is that of herniotomy, and yet the value of herniotomy is never questioned. The immediate success or failure of both operations turns but little upon the operation itself if well performed, but upon two main points—the first being the local condition of the bowel above the seat of obstruction in colotomy, and at the seat of strangulation in herniotomy; and the second upon the general condition and age of the patient when submitted to either ordeal. In both cases, if, from procrastination, serious intestinal changes have taken place, be-

fore relief is given, recovery is hardly to be expected. In both cases, if these changes are but slight, recovery may be looked for; and yet again, in both cases, if from old age or organic visceral disease, feebleness be present, success will not be obtained; for where patients have, from whatever cause, no reserve of power at the Bank of Health upon which to draw in an emergency, the repair of parts injured by disease or operation becomes impossible. It is clearly evident, therefore, that in colotomy, as in herniotomy, the period at which either operation is undertaken, with respect to the changes in the bowel involved in either the obstruction or strangulation, is a matter of primary importance.

In herniotomy this truth is fully recognized; in colotomy it should be. The earlier either operation is performed the better will be the patient's chances; the longer it is postponed the greater will be the risks of serious incurable organic changes taking place in the intestine and consequently the greater the risk to life. In the operation now under our immediate notice can it be said that these truths have had due weight, for has it not been too much the custom—indeed, is it not too much so now for a large part of the profession, and particularly of its medical side—to look upon colotomy as a measure which should only be undertaken when all medical and other surgical means have been proved to be useless, and when an agonizing death within a few hours stares the patient fully in the face unless relief be speedily afforded? Under such circumstances, can there, then, be any wonder that the statistics of both the extra- and intra-peritoneal forms of operation appear at first sight to be so bad, and that those of Erckelen, carefully compiled up to 1884, are made by Treves to show that thirty-eight in every hundred cases of lumbar, and forty-six in every hundred cases of iliac colotomy died within twenty-one days of the operation, though probably, I may add, not from it. To my mind it is, however, a matter of wonder that the mortality of the operation was not higher, for, considering the circumstances under which most, if not all, of these operations were undertaken—that is, as a last resource—the prognosis in all must have been most unfavorable. I believe, therefore, that the statistics I have quoted should be read in another way, and that it should be recognized that 62 per cent of the cases of lumbar and 54 per cent of the cases

of the iliac operation were rescued from the grave, since it is more than probable that all the cases which were operated upon would have been undoubtedly lost if colotomy in one of its forms had not been performed. In fact, it may with truth be asserted that, in spite of the adverse circumstances in which the operation was undertaken, the large majority of the patients gained by it a considerable addition to their lives, while those that sank within the month found relief, and were saved from the intense miseries of a death from obstruction, and died peacefully.

Author's Cases.—I should here say that I have performed 170 cases of lumbar colotomy, and that all but ten were on the left side. One hundred of these were urgent cases, and the operation was undertaken to ward off impending death; of these fifty-five were successful, and forty-five sank within the month. These last are the cases I have described as "too late cases," since it is fairly certain that if the operation had been considered and undertaken at an earlier period of obstruction, and before death stared the patient in the face, many months of life would have been given to each sufferer, and much severe distress would have been saved.

Lumbar Colotomy Cases for Cancer.

One hundred urgent cases, of which fifty-five were successful.

45 died within the month (too late cases).

18 died within twelve months.
19 lived between one and two years.
12 lived between two and three years.
6 are now alive—3 between two and a half and five years after operation; 1, six years.

Seventy not urgent cases

Not one died within the month.

18, or 15 per cent, died within twelve months.

24, or 34 per cent, lived between one and two years.

16, or 22 per cent, lived between two and three years.

12, or 17 per cent, are now alive, and 8 of these from two to six years after the operation.

38 per cent of the whole number have survived the operation from two to six years.

Of the fifty-five successful urgent cases, eighteen, or about one-third, survived the operation a variable number of months, but died within the year; another third lived between one and two years; twelve lived from two to three years; six are now alive, three, two and a half, and three years respectively after operation, and one, a lady aged seventy-one, upon whom I was persuaded to operate nearly six years ago, with the sole view of giving relief to the agonizing pain she was enduring. She was so feeble that I never thought it possible she could live many hours; by good nursing and the careful guidance of her medical attendant she, however, made an uninterrputed recovery, and is now apparently well and suffering but little from her rectal disease.

Seventy cases were operated upon before obstruction threatened life and with the object of giving relief to the constant effort to pass stools and to the pain which was associated with it. Not one of these cases sank from the operation; all convalesced and expressed themselves as grateful for the relief which the operation had afforded. When death came it was painless and from exhaustion—euthanasia. Eighteen of these cases, or about a fourth of the whole number, died within twelve months. Twenty-four, or about one-third, lived between one and two years. Sixteen lived two and three years. Twelve are now alive, eight having survived the operation from two to six years. Another ten or more cases which have been operated upon during the last twelve or eighteen months are alive and going along comfortably. These are not included in the above list.

I should say that in at least three-fourths of the patients who convalesced from the operation and experienced its benefits the artificial anus was a success—that is, that the whole of the fæces were discharged through it, and the local disease was left unirritated by the passage of fæcal matter. In the remaining fourth this desirable result was not secured, and fæces at times—particularly when they were liquid—passed downward, and added to the local irritation of the obstructing disease. Relief was, however, afforded to all these patients by the use of cleansing enemata, injected sometimes from the rectum below, and sometimes from the artificial anus above,

and the subsequent introduction of a sedative suppository through either anus.

With these observations upon my own experience, which I thought well to place before the reader at this period, I will now pass on to consider the relative advantages of the iliac or intra-peritoneal, and the lumbar or extra-peritoneal operation, for within the last few years it has become what I fear I must call the "fashion" to advocate the former as being, in the words of one of its supporters, "greatly superior to the lumbar method;" and the credit of forcing this question upon the attention of the profession must be mainly given to Messrs. Reeves, Herbert Allingham, Harrison Cripps, and Chavasse.

The chief grounds upon which these surgeons advocate the operation are as follows:—(1) That the iliac operation is in itself easier than the lumbar; (2) that by means of the abdominal incision the diagnosis in obscure cases may be verified before the bowel is opened; (3) that by it there can be no possibility of the surgeon mistaking the small intestines, duodenum, or stomach for the large intestine, and that abnormalities of the colon do not mean failure of the operation, since the abdomen can by the inguinal wound be carefully searched; (4) that the bowel can readily be drawn out of the wound, and consequently firmly fixed to the skin without causing undue tension on the stitches; (5) that in lumbar colotomy there is frequently so much prolapse of the gut as to give rise to serious trouble; and (6) that the inguinal position of the wound is far more convenient to the patient for purposes of cleanliness as well as for the adjustment of pads, to guard against the escape of fæces and flatus.

I propose to examine these claims *seriatim*, and will do so in the light of clinical experience as supplied to us by the different classes of cases as they pass under our care, starting with the assumption that the diagnosis of rectal obstruction from cancer or other organic disease is clear. Now, cases of obstruction from rectal disease, cancerous or otherwise, as they come before the surgeon, may be divided into three great classes. The first includes cases which may be called urgent, since they are associated with acute general symptoms and severe abdominal distention. They are cases generally of annular stricture involving the upper part of the rectum. The

second class includes cases of chronic obstruction, mostly of the lower half of the rectum without severe general symptoms, but with abdominal distention. The third class includes all cases of obstruction from stricture of the rectum, but not urgent, in which the symptoms are fairly well marked but without abdominal distention. To each of these three well-defined classes of cases the operation of colotomy has its own special relation.

Is, then, the iliac or inguinal operation easier than the lumbar? Let us inquire. When applied to the first two classes of cases in which great abdominal distention exists, whether with urgent symptoms or otherwise, the difficulties of an iliac operation cannot be trifling. The advocates of the operation may make light of them, but they exist, and the dangers associated with them cannot be ignored. The chances and risks of protrusion of the small intestine as soon as the peritoneum has been opened are real, and if the large intestine has to be searched for, or the abdomen explored for diagnostic purposes, these dangers must be much enhanced. Should the large bowel appear at once at the iliac wound, the operation, it is true, would be much simplified, but this, it is admitted by its advocates, does not always occur; and when it does, the free manipulation of the bowel which is recommended, and to which attention will be drawn later on, would be both difficult and dangerous. In the third class of cases, in which the abdomen is undistended or flaccid, the difficulties of finding the bowel would be slight. On the other hand, a distended abdomen becomes in the operation of lumbar colotomy a condition of advantage, and the searching for the colon under these conditions is, as a rule, by no means a serious matter. If the patient be fat, there is doubtless at times some trouble, but if the surgeon directs his search forward toward the reflected peritoneum, and not backward into the lumbar fat, and at the same time rolls his patient over from the semi-prone position in which he may have been placed for operative purposes, into the semi-supine, so that the bowel may mechanically fall back toward the lumbar wound, this difficulty will be diminished or overcome. In cases in which the bowel is wholly or partially empty the same practice is also of use.

In the iliac operation, however, if the difficulties be really less than those that have to be encountered in the lumbar,

the risks which necessarily appertain to the mere division of the parietal peritoneum must be taken into account, even by the surgeon who admits to the full the impunity with which the healthy peritoneum may be surgically treated. In lumbar colotomy it can only be in exceptional cases that the peritoneum is opened; and should it be so, there can be no more difficulty or danger in dealing with the wound in the lumbar operation than there is said to be in the iliac. In both the risks of peritonitis must, however, be run, whatever those risks may be. I may say that in the 170 cases of lumbar colotomy that I have performed, I have but twice, knowingly, opened the peritoneal cavity, and in those two cases no harm followed.

Conclusion.—I am compelled, therefore, to conclude that the iliac operation is not easier than the lumbar when abdominal distention is present, although when the abdomen is flaccid, such may possibly be the case.

To open the abdominal cavity to search for and find the colon may be an easy measure; in the cadaver it certainly is so, and possibly it may be said to be more so than exposing the colon in the right or left loin. But from the patient's point of view—which is the only right one—can it be truly said that the division of the peritoneum and the searching with the finger in the peritoneal cavity for a bowel which is diseased, or suffering from congestion, the secondary result of disease, involves no more risk to life than the simple exposure of the colon in the loin outside the peritoneal cavity in the lumbar operation? When the parietal incision has been made in the iliac operation, Mr. H. Allingham states that in about half of his cases, and Mr. Cripps writes that in about a third of his, the large intestine presented at once; hence the conclusion is evident that, in the remaining half or two-thirds of the cases, the bowel had to be searched for by the finger in the peritoneal cavity. Mr. Allingham goes on to show us how this should be done. These are his words: "When the large intestine does not present itself, I pass my finger into the abdomen, sliding over the iliacus muscle until I arrive at the intestine, which I hook up to the opening with my finger and thumb. If this manœuvre fails to find the gut, I search toward the sacrum, feel for the rectum, and trace the gut up; should this not succeed, the finger must be passed upward toward the kidney, and the descending colon felt and traced down-

ward." Mr. Cripps writes: "If any other viscera than the colon present, they must be pushed back and the colon sought for by the finger. Sometimes it can be detected by the hard scybalous masses within it, or it can be traced up after passing the finger into the pelvis and feeling for it as it crosses the brim. The colon being found, a loop of it is drawn into the wound." In the cadaver, and possibly in a patient with a flaccid abdomen and viscera undistended, uncongested, and uninflamed, the manipulations which I have just described may be simple to the surgeon, and they may possibly not prove dangerous to the patient; but with an abdomen distended, and viscera which are undergoing the secondary changes which so soon follow long-existing obstruction, this searching process, as quoted above, can neither be free from danger to the patient nor free from difficulty for the operator; while in lumbar colotomy this visceral searching process in the peritoneal cavity can never be required, except on very rare occasions; for on the completion of the parietal wound and the division of the deep fascia, in at least two-thirds of my own cases—and particularly when the bowel is distended, artificially or otherwise—the colon presents at once, and under these circumstances, after the fat and connective tissue are gently separated from the bowel by means of the fingers, the bowel is readily made to protrude through the wound, to which it is secured. In fat subjects it is true that the exposure of the colon may not prove such a simple process as that described, and when the bowel is empty some difficulty may be experienced; but if the bowel be sought as already described forward toward the lateral reflection of the peritoneum from the bowel, and the empty bowel be inflated by Lund's inflator, this difficulty is lessened and overcome. But under no circumstances can the searching process in the lumbar operation be made to involve such important parts as are of necessity implicated in the iliac, although to the surgeon it may prove trying.

It is true, that if the iliac operations were always undertaken before obstruction had become a prominent symptom, and before abdominal distention had taken place, the searching process would doubtless be simplified and rendered less dangerous, although in lumbar colotomy the same conditions would be equally favorable.

Conclusion.—So far, therefore, as the searching for the bowel in the operation of colotomy is concerned, it must be concluded that the lumbar method in the majority, if not in every case, has the advantage.

The second argument which the advocates of iliac colotomy advance in its favor, is that by the iliac incision the diagnosis in obscure cases may be verified before the bowel is opened. But may I ask, has this objection any real weight, and is there in the majority of cases much, nay, any, doubt as to the diagnosis of rectal or colic obstruction? In a large proportion of cases the disease is within finger-touch, and then where is the doubt? Where the hand fails to reach, have we not in the history of the case, in the general symptoms, and in the local symptoms, and particularly where ballooning of the rectum is present,[3] ample evidence to justify the formation of a working diagnosis upon which to base a definite line of treatment? And when the exact seat of the obstruction is not to be made out by the clinical phenomena, have we not abundant pathological knowledge which tells us, in no uncertain way, that in four-fifths of the cases of obstruction the disease is situated below the splenic flexure, and consequently below that part of the colon which would be opened by a left lumbar colotomy, and that in the remaining fifth of the cases a right lumbar operation would almost to a certainty suffice to give relief? May I ask, therefore—should a rule of practice which has hitherto answered for the relief of chronic rectal obstruction be altered so as to suit the exceptional and not the average case, and should the general practice of surgery be moulded by its exceptional cases?

The third reason which has been adduced as an argument in favor of iliac colotomy is that by it there can be no possibility of the surgeon mistaking the small intestine, duodenum, or stomach for the large intestine; and that abnormalities of the colon do not mean failure of the operation, since the abdomen can by the inguinal wound be carefully searched.

The first half of this argument may have weight with some minds, but it does not recommend itself to my own. I do not regard it as a fair one, for the mistakes, to which attention has been drawn, are clearly due to errors of judgment or carelessness which belong more to the operator than the operation; and in estimating the value of an operation we

are bound to assume that the surgeon is reliable. Errors of all kind must creep into all work, and particularly into surgical work, but they cannot be legislated for. May I ask, are mistakes in iliac colotomy quite unknown? Has the small intestine never been opened in error? With respect to the abnormalities of the colon, about which so much has been written and said, and upon which the advocates of the iliac operation base an argument against lumbar colotomy, I hardly know what to say. That such may occur, I, as an anatomist, must admit; but if so, I presume to suggest that this same chance of abnormality may occasion trouble in the iliac as in the lumbar method, although such may possibly be of a different form. But in a surgical point of view is the chance of an abnormality of the colon being present an argument which should tell more against lumbar than iliac colotomy? My own experience says "no," with no uncertain sound, since out of my 170 cases of lumbar colotomy I have not met with any instance which gave rise to a serious trouble, or that rendered the operation in any way a failure. On one occasion I had to increase my oblique incision forward and pick up the colon at the brim of the pelvis, thus opening the peritoneum; but I subsequently restitched the edges of the peritoneum to the bowel and completed the operation as usual, and with a good result. With this experience, therefore, while we may admit the possibility, we may, I think, fearlessly dismiss the probability of the presence of any abnormality of the bowel from our minds, and regard it with no more fear than we do the risk of meeting with an anatomical irregularity in any operation upon an artery for aneurism or other purpose. In a surgical point of view the risk need not influence practice, and certainly should not tell against the lumbar operation.

The fourth argument adduced in favor of the iliac operation, "that the bowel can readily be drawn out of the wound and consequently firmly fixed to the skin without causing undue tension on the stitches," is in a measure true; but it applies more to the condition of the large bowel when empty than it does to that of a patient the subject of obstruction, since a loaded bowel could hardly be thus manipulated. An empty sigmoid flexure can, however, when seized, be readily drawn through the iliac wound to the extent of many inches, whereas an empty colon can at the most be drawn out through the

lumbar wound to the extent of three or four inches. But is this free extrusion of the bowel at either the iliac or lumbar opening a matter of primary importance? Is it essential for the formation of a spur deep enough to prevent the passage of fæces past the artificial opening into the bowel below, and so down the gut to the seat of disease, where it may become a source of local irritation and pain? Mr. Herbert Allingham and Mr. Harrison Cripps, the two most prolific writers upon this subject, say it is, but of this I think evidence is wanting, since my own experience tells me that this result can usually be brought about by much milder measures than those suggested and carried into practice by the advocates of iliac colotomy.

In my own practice of lumbar colotomy, in which an oblique parietal incision is its leading feature, I have been able to secure this result not only in the majority of cases in which I have been called upon to operate at a stage of the disease in which the symptoms were not urgent and the colon was not overloaded, but in a large proportion of the urgent cases undertaken for obstruction. This result has been sécured by separating the colon from its posterior lumbar attachments by means of the finger; drawing it well out of the wound; and so rotating it forward as to bring the posterior wall of the bowel with its longitudinal band to the surface, and there fixing it. In some instances this desirable result was secured rapidly after convalescence, in others it was not obtained for several months, and in three or four cases I have had to enlarge the wound backward toward the kidney to bring it about. The strongest evidence I can bring forward to support this practice is, however, found in the fact that in three examples of recto-vesical fistula upon which I have operated, and in which the passage of fæces and flatus into the bladder caused intense distress, neither fæces nor flatus passed downward into the bladder within a few weeks of the operation, although in two of the cases urine occasionally passed at night from the bladder upward, and escaped out of the lumbar wound. One of these patients lived eighteen months after the operation, a second lived seven years, and the third was known to have been alive and well fifteen years later. I have likewise many patients now going about the world enjoying life in comparative comfort who are never troubled by the

passage of fæces downward to the seat of disease. It is true that this desirable condition is not always to be secured, more particularly when the operation has been undertaken with a bowel over-distended, under circumstances of urgency, and when the surgeon is unable to bring about the required extrusion of the colon through the wound. But even in these cases there is not always any very serious distress, particularly if the rectum and the lower part of the bowel be kept empty by the use of cleansing enemata followed by the introduction of a sedative suppository; for, with the artificial anus established above the seat of obstruction, the straining and forcing of the bowel, which previously may have caused much distress, are done away with, and as a consequence there is comparatively little pelvic pain. Indeed, even a foreign body may rest for months at the seat of obstruction without giving rise to any serious symptoms; for I have in my possession a rubber plug which was, from carelessness on the part of a medical patient, allowed to pass from the colotomy wound downward into the rectum to the seat of disease, and which remained in that position for twenty months without giving rise to any trouble, and was then expelled upward by the action of the intestine and out of the colotomy wound, when the history of the lost plug was obtained. It may, therefore, be said that in the majority of cases of lumbar colotomy a sufficient spur is commonly obtained by the simple measures I have been in the habit of employing and which I have just described.

Before leaving this question of spur, I must allow the advocates of the iliac operation to explain their practice, and I shall do so by using their own words. Mr. Herbert Allingham, in the last edition of his father's work on "Diseases of the Rectum," as well as in papers of his own published in the "British Medical Journal" for October 22d, 1887, and April 27th, 1889, goes fully into the way he believes this spur is to be obtained, and at the same time points out by what means the serious prolapse of the bowel, which he admits frequently follows the iliac operation, can be best guarded against. Mr. Cripps also describes his method in the same journal for April 27th, 1889. "When the gut is found," writes Mr. Allingham, "and brought to the surface, I look for a piece with a sufficient mesentery, by passing the gut through the fingers;

of course this can only be done if the disease is in the rectum or lower part of the sigmoid flexure. Generally the part of the sigmoid first pulled up has quite sufficient mesentery. If it is fixed to the back of the abdomen, there being a very short mesentery, I pull up as much of the gut as possible, and stitch it to the wound, so that the intestine when opened (some days later) looks like the orifice of a double-barrelled gun. This appearance is obtained by introducing the suture in the following way:—A needle threaded with carbolized silk is passed through the mesentery, close to the intestine, then through the abdominal wall on both sides at the middle of the wound, and the sutures are tied up tight. If there is little or no sigmoid meso-colon, I am obliged to pass the sutures through the muscular and serous coats of the gut at its posterior part. Leaving a fair-sized knuckle of loose gut outside the wound, I next sew the gut all round to the skin, passing the thread only through the muscular and serous coats. This is done carefully, so as not to prick the mucous coat. Antiseptic dressings are then applied. The gut is not opened for two or three days, unless bad symptoms appear." Mr. Harrison Cripps writes: "The colon being found, a loop of it is drawn into the wound. In order to avoid the prolapse which is likely to occur if loose folds of the sigmoid flexure remain immediately above the opening, I gently draw out as much loose bowel as will readily come, passing it in again at the lower angle as it is drawn out from above. In this way, after passing through one's fingers an amount varying from one to several inches, no more will come. Two provisional ligatures of stout silk are passed through the longitudinal muscular band opposite the mesenteric attachment. These provisional ligatures help to steady the bowel during its subsequent stitching to the skin, and, moreover, are useful guides when the bowel is ultimately opened. They should be about two inches apart." I have quoted in full these two surgeons' remarks upon the methods they employ to bring about the required result, as my desire is to do them full justice; but I cannot fail to draw the conclusion that, to carry out the practice as recommended, it is clearly intended, although it is not stated, that the operation of colotomy should be undertaken at an early period of disease, and before symptoms of obstruction have become marked, for the manipulations described could

never be carried out with an inflated abdomen and distended and possibly injured colon, nor could they be said to be free from danger. The means these surgeons employ to obtain their object are far more serious, and in my view more dangerous, and, so far as evidence goes, not more successful than the simple measures I have already described as applicable to the lumbar operation.

The next or fifth objection that I have to consider which has been raised against lumbar colotomy has reference to the prolapse of the bowel, which is said by the advocates of the iliac method to occur after convalescence has taken place in the lumbar operation, and which is stated to give rise to serious trouble. I must assume that this objection is real and based upon facts, and is not theoretical; for my own experience does not allow me to support it in any way. Indeed, in only one out of my 170 cases has this complication arisen, and in it it was the distal end of the colon which was at fault. The prolapse was also readily controlled.

A certain amount of prolapse after lumbar colotomy must be looked upon as an advantage, and I never feel certain that my patients are safe from the occasional passage of fæces past the lumbar wound downward into the rectum until it has formed. I like one equal in extent to that which normally takes place in the horse in the defæcating act. Such a prolapse I have called the equine prolapse.

To have the question of prolapse, therefore, raised as an objection to lumbar colotomy is somewhat comical, and more particularly when we read in the writings of the advocates of the iliac method of the very severe measures which are considered justifiable to guard against it. Upon this point Mr. Allingham writes: "Through the new opening in the groin the intestine protrudes, and is a source of constant trouble and discomfort. Some patients have told me that had they been aware of the possible sequela they would never have consented to undergo the operation. Their life is simply spoilt, and they are practically prevented from going about and mixing with the world at large in consequence of the constant protrusion of the mass." After this serious grievance has been noticed, he goes on to describe the measures he adopts to prevent this trouble from following the iliac operation; and these means are, first, the pulling out of the gut through the

iliac wound by its lower end till no more can be made to protrude, and this is to be followed by the same treatment of the upper end. The mesentery is now quite taut, and a large bunch of intestine several inches in length has been drawn through the opening, and is allowed to rest upon the abdomen. This bunch is then at its neck carefully stitched through its mesentery and muscular and serous coats to the edges of the wound. Later on this mass is excised, and it is interesting to note that quantities ranging from three and a half ounces to six ounces in weight of intestine can be removed, without, as Mr. Allingham adds, "any apparent detriment to the patient." As a physiological experiment these facts are of interest, but surely in a purely surgical point of view these measures tend to magnify the dangers of the iliac operation. Mr. H. Allingham admits this to be the case, and "confesses that this supplementary procedure of cutting away so large a quantity of gut has materially increased the seriousness of the operation; although," he adds, "the exceeding discomfort occasioned by this possible procidentia necessitates a fair grappling with the circumstances."

Mr. Allingham fails, however, to point out what must be as evident to his as it is to my mind, "that the pulling out of the gut through the iliac wound by its lower end till no more can be made to protrude, and this to be followed by the same treatment of the upper end," must of necessity bring the local disease for which the colotomy is made dangerously near the wound. For my own part, if the measures I have quoted be necessary to make iliac colotomy a success, I can hardly admit that the operation as a rule of practice should be chosen so long as we have at our disposal the old and approved lumbar method, the objections to which are very unreal, and which under no circumstances can be complicated with conditions which can require any such severe surgical measures as those I have described, and particularly if the case be treated early. The last and sixth argument I have to notice which is raised against lumbar and in favor of iliac colotomy has reference to the position of the artificial anus; the advocates of the latter operation maintaining that the iliac anus is more convenient to the patient for purposes of cleanliness as well as for the adjustment of pads to guard against the escape of fæces and flatus. Now, is this wholly true? That it is so to

a degree may be at once admitted, for with an anterior wound the necessary process of washing is more readily carried out than it can be with a lumbar opening, although with it the difficulties are not found to be serious. But can it be said that the escape of fæces and flatus from the iliac opening is more readily controlled by pads and instruments than it has been found to be from the lumbar? My own experience tells altogether the other way; for the loin is a fixed and firm position, and its condition is much the same so far as resistance is concerned at all times. A good pad and dressing can consequently be readily maintained *in situ* without trouble or inconvenience; and if the patient wears stays, this difficulty is lessened. With the iliac method these stable conditions of parts cannot be said to exist. A pad and bandage which is satisfactorily adjusted with the patient standing will require readjustment with the patient sitting and the variable condition of the bowel itself must always keep up constant change. I have been consulted by several subjects of iliac colotomy upon this point, and found their grievance to be a real one, and more particularly since it is irremediable. In three cases of iliac artificial anus which I have had, the difficulty was insuperable. Upon this score, therefore, as upon many others, I hold the lumbar operation to be preferable.

There are also certain cases of rectal cancer in which iliac colotomy seems to be quite inapplicable—that is, when the disease is fairly high up and involves the bowel above the brim of the pelvis. In these cases iliac colotomy would be a failure, as the opening would be below the seat of the disease, or the colotomy wound would be too near the diseased structure to be a success, since the chances of the growth spreading to the wound would be great, and the complication most detrimental. In all cases of iliac colotomy for rectal cancer this fear is real; indeed, in the lumbar operation itself, cases are not rare in which the lumbar wound has become involved from the extension of the rectal disease. On the other hand, there is a class of cases in which the iliac method may have the advantage, and that is when the diagnosis of the case is less clear than usual, and the position of the bowel uncertain. Of this I have had one example, the incision, as Mr. Cripps rightly states, acting at first as an exploratory procedure for diagnostic purposes, and later on as a remedial measure. But

these cases are most exceptional, and, as I have already said, the practice of surgery must be based upon average cases, and not upon rarities. By iliac colotomy, also, the surgeon may be more frequently able to turn the case into one of colectomy, or excision of the growth, than by the lumbar method. I have done this but once in all my lumbar operations, and that case is fully recorded in the Royal Medical and Chirurgical Transactions for 1882, Vol. LXV. With these comments upon the objections which have been raised against lumbar colotomy, and the supposed advantages of the iliac method, I must now sum up my material; and to save time I have done so in the form of a series of propositions.

1. For the iliac operation to be a success, the large bowel should not be loaded with fæces, the abdomen be by no means tense, and the symptoms of obstruction far from urgent; since under opposite conditions (such as those too commonly met with) its supposed advantages would hardly be demonstrated. The searching for the bowel would, moreover, be a serious difficulty; the free manipulation, extrusion, or excision of the bowel which is advised would be unsafe even if practicable, and the necessity of having to open the bowel upon its exposure would, when called for, add to the dangers of the measure. The iliac operation, consequently, would appear to be applicable to only a small class of cases. If, then, it can be said that iliac colotomy is an easier operation than the lumbar, when the large bowel is empty, the abdomen flaccid, and the symptoms of obstruction unpronounced, it can without hesitation be asserted that with a distended abdomen and colon and urgent symptoms the lumbar operation is the simpler of the two.

2. To search for the colon in iliac colotomy performed upon a patient with an undistended abdomen and free from all urgent symptoms may neither be difficult nor dangerous; but with the opposite condition, in which the bowel above the immediate seat of disease is damaged from prolonged obstruction, danger must exist, and such a danger must be added to that which appertains to the peritoneal wound. In lumbar colotomy neither of these dangers has to be met; such searching for, extrusion, and dragging outward of the colon as is considered to be essential in the iliac operation is never requisite, since the spur which is considered to be so essential to guard against

the passage of fæces past the artificial opening in the iliac method can in the lumbar be obtained by far simpler means.

3. The prolapse of the bowel at the artificial opening which has been adduced as an objection against lumbar colotomy does not rightly or of necessity belong to it. To judge by my own experience, it is imaginary. In the iliac operation the objection is admitted, and sought to be remedied by an operative measure which is in itself of far greater magnitude than any lumbar colotomy I have ever done or seen.

4. The fear of an abnormality of the colon rendering the operation of lumbar colotomy a failure is practically groundless. I have known it to occur but once in my own practice, and in that case the patient suffered no harm. Such a fear, therefore, need in no way tell against the lumbar measure.

5. The greater convenience of the iliac over the lumbar wound for toilet purposes may at first sight seem plausible, but this apparent advantage is more than counterbalanced by the greater difficulty that exists in keeping any dressing or compress in position over the anterior opening to prevent the escape of the intestinal contents than is ever experienced over the lumbar.

6. The final conclusion is, therefore, clear that iliac colotomy is not yet proved to be superior to the lumbar operation. In doubtful cases, in which an exploratory incision is required for diagnostic purposes, it may be useful, but such cases are very few; in all others, lumbar colotomy has advantages which stamp it as the better measure.

The single advantage that I can see in the adoption of the iliac method is that the question of operative interference will have to be taken into account at a far earlier period of the patient's trouble than it has been hitherto the custom to consider the propriety of the lumbar operation; if so, we may soon see the valuable operation of lumbar colotomy take its right place in the practice of surgery, and good may come out of a fashion which has certainly not been a universal success.

I regret to say that the notes of my cases are not sufficiently full to allow me by statistics to support a valuable remark by Mr. Jessop, in his instructive paper on the treatment of Cancer of the Rectum at the Leeds meeting of the British Medical Association in August last, although I am convinced that, upon the whole, he is right, and "that in cancer of the

lower half of the rectum we have not much fear of the occurrence of complete stoppage, and that that which occurs may in the majority of cases be got over for a time by injections, the introduction of the finger, or of bougies, the use of laxatives, and the like; but that where the upper portions of the rectum are involved, complete blockage is almost certain sooner or later to appear." Mr. Jessop's explanation of this fact is also doubtless correct, and it is found in the anatomical relations of the upper and lower portions, for whereas the rectum as it approaches the outlet becomes more closely applied to the sacrum and pelvic wall, in its superior portion it is comparatively free, and thus the contractile action of the colon above is exerted with effect in forcing the contents through a contracted ring where that ring is fixed and immovable; whereas, when the narrowed portion is free, movable, and not attached, as it is when seated in the upper portions of the rectum, the efforts of the bowel above succeed only in invaginating or otherwise displacing the growth, often so as to enable us to make a complete diagnosis by bringing the disease within reach of the finger, and fail altogether in effecting any onward movements of the contents.

In cancerous disease of the lower part of the rectum colotomy is, therefore, called for more for the purposes of relief of local distress than for pressing obstruction; while in the cases of cancer of the upper part of the bowel, the same treatment is called for, again using Mr. Jessop's words "as soon at least as the first symptoms of impending blockage appear, and in time to anticipate those further changes upon which the mortality of colotomy so much depends."

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MASSAGE OF THE ABDOMEN.

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MASSAGE OF THE ABDOMEN.

CHAPTER I.

HISTORY.

MASSAGE of the abdomen is very ancient. The father of medicine, Hippocrates, made use of it, and in his works we find accounts of the practice of massage of the abdomen which consisted of shampooing, pressure, and dry friction. At that time massage was employed in cases of abdominal swellings, borborygmi, etc. Oribasius says that when the subthoracic viscera are to be submitted to apotherapy, the abdominal muscles should be stretched and friction made. However, though therapeutical massage was resorted to in certain diseases of the abdominal viscera at the very dawn of medical science, it was not until the present day that physicians have recognized abdominal massage as a powerful agent, and, by giving scientific attention to the subject, have lifted it out of the hands of charlatans, "rubbers," etc., to whom it had long been left.

In our own time massage of the intestines has become popular, thanks to Metzger and his students, to Reibmayr, Berne, and Hühnerfauth. We now know the indications and contraindications of this practice; its modus operandi is clearly described in the excellent work of Reibmayr-Petit.

But while massage of the intestines is widely recognized and daily practised, massage of the stomach has scarcely ever been referred to.

We are at a loss to understand why massage, up to the present time, has hardly been applied to the treatment of various diseases of the stomach. Electricity has been used to excite contractions of the stomach, the stomach-pump has

been applied to empty that organ of its contents in cases of dilatation; why has massage been neglected—an agent at least as efficacious as any other means for stimulating the contractions of the stomach?

It is true, we occasionally find massage of the stomach mentioned in the writings of different physicians. Thus Georgi stimulated the muscular tunic and the gastric mucous membrane by imparting to the organ a vibratory movement under the false ribs, in the left half of the body, in a direction from below upward and from without inward. This vibratory movement acts on the muscular tunic of the stomach or else it effects a diminution of the gastric secretions. Percy and Laurent say that some people who habitually eat a great deal do not digest until they have been, as it were, pounded or beaten; they are obliged to knead or beat themselves over the gastric region with the open or shut hand, otherwise the accumulating gases cannot escape and digestion proceeds but slowly and imperfectly.

According to Aretæus, in cases of heartburn, pyrosis, acid eructation, and regurgitation there is nothing better than massage. Grisolle thinks that chronic gastritis may also be successfully treated by massage.

All these statements are vague; no rules are laid down as to indications or as to method. Even in special treatises on massage we find no more information on massage of the stomach than in the authors mentioned. Thus even in Estradère, from whom we have taken most of our historical notes, we find only some theoretical remarks as to the utility of massage in atony and inactivity of the stomach, in flatulence and dilatation of that organ, and finally in a number of ailments grouped together under the name of dyspepsia. In the works of Norström, Schreiber, and Reibmayr-Petit massage of the stomach is not even mentioned. Zabloudowski, in his essay "Zur Massage-Therapie," reports the results he obtained by massage in the treatment of dilatation of the stomach. In the thesis of Chpolianski we find some experiments relating to the influence of abdominal massage on the duration of gastric digestion.

As to the influence of abdominal massage on the renal secretion the history is still scantier. We were the first to call attention to the fact that under the influence of abdominal

massage the secretion of urine becomes notably increased. The only publication which appeared previous to our work is that of Winiwarter regarding a case of ascites due to a multilocular ovarian cyst which was visibly ameliorated by massage of the abdomen. In this case, mentioned in nearly all treatises on massage, the result of this treatment was a marked increase in the quantity of urine excreted. In this connection Winiwarter recommends abdominal massage as a diuretic in all cases in which other diuretic remedies may be indicated. The paper by Poloubinski, published in "Vratch," entitled "Influence of Massage of the Abdomen on the Function of the Kidneys," appears to confirm our results.

CHAPTER II.

MODUS OPERANDI.

SHOULD massage of the stomach be intrusted to an operator who is not a physician? The following will sufficiently prove that massage of the stomach, as well as of all the abdominal organs (intestines, uterus, etc.), should be performed by the physician himself.

The patient under treatment should be in the recumbent position on a bed or couch accessible from either side. To relax the abdominal muscles the patient's buttock should be slightly elevated and the thighs flexed. The patient is directed to breathe quietly, with the mouth open.

Massage, in order to be well borne, should be performed at least two hours after meals. However, sometimes it is precisely during the first hour after eating that patients troubled with sluggish digestion experience painful sensations; in these cases the treatment should be carried out during the first hour after eating, the method being the one described below under the head of "superficial or light massage." But, generally speaking, it should be performed at from two to three hours after fluid alimentation, and four or five hours after solid food.

Before proceeding with the masso-therapeutical manipulations about to be described, the patient's abdomen should be examined by percussion and palpation to determine the degree of fulness or emptiness, or the meteorism of the stomach and intestines, as well as the degree of sensibility and resistance of the abdominal muscles to pressure. For it must be remembered that occasionally the abdominal muscles remain contracted despite all efforts of both the physician and the patient. All these conditions are important, because on them will depend the manipulations to be employed.

Massage of the abdomen is divided into:

1. Strong or deep massage.

2. Light, mild, or superficial massage.

Each variety is divided into two parts, in whatever region of the abdomen it is performed:

1. Massage of the abdominal muscles.
2. Massage of the abdominal organs.

Massage of the abdominal muscles is begun by a skimming or grazing of the recti muscles—"effleurage," that is to say, from the epigastrium to the pubes and vice versa; then follows that of the oblique muscles. These movements are followed by a light kneading or pressing, manipulations that should be executed with a great deal of caution so as not to pinch the viscera. It should be done slowly and superficially. After having executed these movements for five minutes, and after having lightly tapped the muscles in a direction perpendicular to that of their fibres, we pass on to the massage of the stomach itself.

Having determined by physical examination, by palpation, percussion, or any other means, the limits of the stomach, pressure is exerted by the palm of one or both hands, at first light, then gradually stronger, the direction being from the lower and left part of the stomach toward the pylorus. These manipulations, as well as those which follow, should be executed very slowly. From these we pass on to the digital manipulations or what masseurs technically term "shampooing," "malaxations." The stomach is seized by the hand, the fingers of which are slightly separated, and is squeezed or pressed as would a bladder placed between both hands which it is desired to empty of its contents.

We make use of still another kind of manipulation already described in our first publication on massage of the abdomen, which is performed in the following manner: separating the fingers of one hand, we place the fingers of the other in the interdigital spaces, and thus form a sort of comb or brush. With this we produce pressure over a great part of the stomach. Of course, this pressure should be directed from the greater curvature and left extremity of the stomach toward the pylorus.

It is evident that this manipulation, as well as the kneading and shampooing of the stomach, can be executed only in cases in which the abdominal muscles are absolutely relaxed. Where they are not, it will be well to omit these movements; the

fingers become fatigued in vain, the patient is made to suffer needlessly, for the result is negative. After these manipulations of kneading and shampooing, we proceed to the vibratory movements of Georgi. To perform these, the hand is applied on the middle of the stomach, where it exerts light pressure, which should be abrupt and intermittent. The sitting is terminated by massage of the intestines by the method of Reibmayr-Petit. No sitting should exceed half an hour.

In this manner deep massage is performed. Superficial massage is indicated in cases of extreme sensibility of the gastric region, in nervous gastralgia, and in those in which the abdominal muscles cannot be relaxed despite all the patient's efforts.

We use no greasy substance in mild or superficial massage. We believe that the dry hands are better for irritating the skin and thus provoking reflex phenomena. As to deep massage, described above, we believe it to be a matter of no importance whether or not any greasy substance is employed. We ourselves use vaseline in these cases.

The first part of the sitting is the same as in deep massage, and consists in massage of the abdominal muscles. The second part of superficial massage is composed of skimming or grazing movements (effleurage) and of friction with the pulp of the fingers in a direction from the greater curvature of the stomach toward the pylorus, in the epigastric region and around the umbilicus. These movements should be very light. The skin should scarcely be touched. But the effect produced is nevertheless very marked, for we see that under their influence very strong contractions of the stomach result by reflex action. Mild or soft pressure, which has a soothing influence, is that produced by applying the palm of the hand to the gastric region and allowing it to remain immobile for one or two minutes, exercising a slight pressure during a few seconds only. Hühnerfauth has observed that under the influence of this light pressure, and of animal heat which is necessarily produced in the region of the heart, attacks of angina pectoris are ameliorated. To produce these results the hand of the masseur should be neither cold nor covered with grease: it should be dry and warm.

CHAPTER III.

PHYSIOLOGY.

A PRIORI it is clear that the effects of massage of the stomach will be multiple. We may group them as follows:

1. Mechanical effects, direct or reflex. In this group will be included also the influence of massage on the retention of food in the stomach.
2. Chemical effects.
3. Nervous effects.

Mechanical Effects.—In order that the stomach may perform its peristaltic movements, and empty itself of its contents, it possesses, like all other parts of the alimentary canal, two kinds of muscular fibres: circular and longitudinal. Among the circular fibres the cardia, the pylorus, and the band on the upper border of the stomach, known in French as the "cravate suisse," are particularly important.

In its physiological state during digestion, the stomach remains closed by the contraction of the cardia and pylorus, and is divided into two parts by the contraction of the layer of oblique fibres called "cravate suisse" (Küss and Duval). When the stomach is about to empty itself, the pylorus opens first, and the cravate suisse remains contracted. The pylorus being open, it is sufficient that the longitudinal fibres should contract so that the right part of the stomach may empty itself completely or partly. Analogous phenomena take place when the left part of the stomach, the large cul-de-sac, is about to empty itself. The oblique fibres or "cravate suisse" should first relax, then will follow the contractions of the circular fibres, succeeded by that of the longitudinal fibres of the left extremity of the stomach, forcing out a part of its contents into the right division of the stomach. The "cravate suisse" again contracts, the pylorus opens, another contraction of the longitudinal fibres follows, and the right division of the stom-

stomach. We believe, therefore, that the elastic walls of the stomach will yield more readily to this pressure than the rigid tissue of the contracted pylorus. The result will be an increase of the dilatation. There is even a risk of rupture of the stomach.

Moreover, the effect of massage on any part is to cause an afflux of blood, more intense in the neighborhood of the stomach. This afflux of blood will facilitate and favor the nutrition of the tissues, and consequently of the muscular tissue. The result will be the same in all muscles: they will be better nourished and better capable of performing additional work, the muscle being increased in volume and in strength.

Influence of Massage on the Retention of Food in the Stomach.—Direct experiments and clinical observation have clearly demonstrated that massage of the stomach acts incontestably on the retention of food in that organ. We have endeavored to settle this question by two methods. In the first place we repeated Chpolianski's experiments, then we made a series of experiments with salol.

The experiments of Chpolianski are as follows: He administered to persons in good health milk, oat-meal water, gruel, eggs, and meat. Then he washed the stomach with the stomach-pump and sought to ascertain the moment when the water from the stomach became colorless and contained no trace of food. These experiments, several times repeated, demonstrated to this author that gruel remained in the stomach for 1 hour 50 minutes; after abdominal massage for ten minutes, 1 hour 35 minutes.

Two eggs remained 4 hours 15 minutes in the stomach; after ten minutes' abdominal massage, 2 hours 47 minutes.

Nine ounces of roast meat remained in the stomach 5 hours 35 minutes; after abdominal massage, 3 hours 30 minutes.

Thus we see that massage reduces the duration of digestion by 15 minutes for gruel, 28 minutes for eggs, and 1 hour 5 minutes for meat.

We are obliged to remark that our own experiments, undertaken with a view to verify the results of Chpolianski, are not conclusive. First of all, Chpolianski experimented on persons in good health, and not on patients. But even in people whose digestion is in no wise impaired, the application of his method is not above criticism. In fact, the stomach is an

organ so capricious in its function, we know so little of the manner in which it empties itself of all or of part of its contents, that any method which aims at determining the moment at which it is entirely emptied is not satisfactory. Thus we have found that in the same individual the same article of food remained in the stomach a variable time, without being able to ascertain the causes of these variations. In our patients one pint of milk remained in the stomach 3 hours 30 minutes in some cases; at other times 4 hours 30 minutes. We have demonstrated the same thing regarding solid food. Six ounces of hashed roast meat took 7½ hours to pass through the stomach. It has happened that after 6½ hours we have found the stomach empty, and sometimes after a lapse of 8 hours it contained still some remains of meat. And that without any trouble on the part of the intestines and without any modification of the habitual morbid sensations.

Very often we have had occasion to observe while washing out the stomach of people whose digestion was in no wise impaired, the presence of the remains of food which they had swallowed several days previously.

In our patients submitted to massage, digestion unquestionably improved under the influence of this treatment, the symptoms of the disease ameliorated or even disappeared since the patients increased in weight, although on washing out the stomach we rarely found it empty.

In order to form an opinion of the value of massage for gastric digestion we are obliged to look for another criterion.

We now pass on to the description of our experiments with salol.

Salol, described by Nencki, of Berne, is decomposed by an alkaline substance into salicylic and phenic acids. Whenever the presence of salicylic acid can be demonstrated in the urine, it is evident that a portion of the salol has passed from the stomach into the duodenum.

We administered to a number of sufferers from chronic dyspepsia and dilatation of the stomach, as well as to persons whose digestion was unimpaired, 15 grains of salol, and found that we could not demonstrate its presence in the urine as salicylic acid before the lapse of from 2 to 2½ hours. In this respect our results do not coincide with those of Ewald, who affirms that salicylic acid is always found in the urine one

hour after the administration of salol, while the experiments of Brunner and of Huber confirm our results.

Besides we ascertained that after some exertion (walk of fifteen minutes' duration, gymnastic exercises for ten minutes) salicylic acid appeared in the urine 1 hour 5 minutes after the administration of salol. We obtained the same result by faradization of the gastric region for a quarter of an hour.

These experiments show that a portion of the salol passed from the stomach into the intestines. Whether this portion be large or small is of little importance, the essential point being that under the influence of massage of the stomach the salicylic acid of the salol appeared in the urine about one hour sooner than under usual conditions. This part of our experiments proves to us again that among the measures recommended to hasten gastric digestion (walking, gymnastic exercises, faradization of the stomach), massage is the most efficacious of all.

Experiments of another nature, also with salol, demonstrate the effects of abdominal massage.

Dr. Huber, of Zurich, has shown that not a trace of salicylic acid is found in the urine 26 hours after the absorption of 15 grains of salol in persons with normal digestion. But in persons who suffered from slow digestion traces of salicylic acid were found in the urine even on the third day.

We have repeated these experiments with identical results.

CASE I.—Man, aged 62, affected with dilatation of the stomach. At 10 A.M. 15 grains of salol were administered. The following day at the same hour the presence of salicylic acid was demonstrated. The next day the same result. At 8 o'clock P.M. the urine still assumed a violet color on the addition of perchloride of iron. The urine passed during the night also gave the same reaction of salicylic acid. The following day at 10, no violet coloration was obtained. Thus we see that in this patient about 62 hours passed before the disappearance of 15 grains of salol.

During the four following days we examined the urine of our patient several times and found no further trace of salicylic acid. We again administered 15 grains of salol; one hour afterward we performed massage for half an hour. The following day at 10 o'clock examination of his urine dem-

onstrated the presence of salicylic acid. Again abdominal massage for twenty minutes. Examination of his urine at 8 P.M. demonstrated the presence of the acid. But the urine of the same night, preserved in a glass jar, contained not a trace of salicylic acid.

CASE II.—Woman, aged 41, suffering from chronic nervous gastritis. Submitted to the salol experiment, we demonstrated that 48 hours must elapse before salicylic acid disappeared from the urine. But under the influence of massage we found no trace of salicylic acid in the urine 36 hours after the administration of salol.

These experiments prove that salol may be used to measure the degree of rapidity of gastric digestion. They also prove (and this is of very great importance to us at this moment) that under the influence of massage salol is sooner eliminated from the stomach, that is to say, that gastric digestion proceeds more actively.

The results of these experiments confirm our theory: massage of the stomach is a powerful agent for stimulating the contractions of the stomach, and for shortening the time of retention of food in that organ.

Chemical Effects.—The mechanical effects of massage of the stomach which we have just described are of great importance, and alone justify the use of this powerful agent in the treatment of diseases of the stomach.

But it is certain that massage also affects or modifies the chemical phenomena of digestion.

In order to prove this a series of experiments should be made. Let us examine the gastric juice, the degree of its acidity, its digestive power; then submit the patients to abdominal massage, and after this operation again test the properties of the gastric juice.

In this way we shall have direct proof of the chemical effects of massage of the stomach. We hope at some future day to be able to fill up this gap in our work. In the mean time we believe ourselves justified in stating, a priori, that masso-therapeutical manipulations, by producing a greater afflux of blood to the stomach, also modify the secretion of the gastric mucous membrane. But apart from theoretical considerations, daily practice as well as the analysis of the cases which we here pub-

lish prove that under the influence of massage the chemical phenomena are greatly modified.

The amelioration, followed by the disappearance of the morbid phenomena of defective digestion, such as cardialgia, fœtid breath, sensations of weight and fulness, disagreeable taste in the mouth, etc., may serve as evidence. Without having direct experimental proof, we may nevertheless admit that the amelioration, indeed even the disappearance of these symptoms, will be due not only to the more energetic contractions of the stomach, but equally to a more abundant secretion of gastric juice, of perhaps a better quality.

Nervous Effects.—We have very little information as to the manner in which the stomach is supplied by nerves, and of the rôle its nerves play in the function of that organ (Beaunis). However, daily observation shows us that the stomach is the seat and starting point of a number of reflex phenomena. Therapeutics from time immemorial appeal to these properties of the stomach. In fact, sinapisms, poultices, counter-irritation by hot irons, etc., applied to the gastric region in the treatment of the most varied affections of that organ naturally cannot act directly on the stomach; if they have any influence whatever, it can only be by reflex action. Abdominal massage likewise ought to be classified in this category of therapeutical agents, especially that form which we have described above under the name of superficial or mild massage. Household medicine accords to friction of the abdomen a high rank for the relief of gastric pain. The expression "to rub the belly" when hungry proves also that light massage is capable of soothing that sensation which we call hunger and which is only a kind of pain.

Light friction, slow and moderate pressure over the region of the stomach, are most efficacious means for subduing hysterical hiccough even in the most inveterate cases, and those complicated with gastralgia, spasm, etc.

We have no right to deny to strong or deep massage any influence on the nerves of the stomach. If under the influence of strong massage the tissues composing the stomach are regenerated, its nerves are certain to participate in that regeneration. Hence the morbid phenomena which are due to changes in the gastric nerves, and about which we know nothing, will be successfully treated by massage.

CHAPTER IV.

THERAPEUTICS.

AMONG the diseases of the stomach which may be benefited by massage, dilatation of the stomach holds the first place, both by its theoretical interest and by the results obtained. All varieties of dilatation of the stomach, however, cannot be treated by massage. Thus dilatation due to organic stricture, cicatricial or other, should not be treated by massage. Despite the assertions of Zabloudowski, it appears to us highly improbable that such patients can be benefited by massage. We have given our reasons for this view above.

We have employed massage in another class of gastric disorders, in that form of dilatation which might be called idiopathic, that is, unassociated with organic stricture of the pylorus. This disease has been specially studied by Bouchard. To the same learned clinical observer we owe the knowledge of the surprising fact, that patients are often bearers of an enormous stomach without being in any way inconvenienced by it; that is, they may have dilatation of the stomach without having any digestive troubles.

Notwithstanding the numerous works on pathology, that of the idiopathic form of gastric dilatation remains still very obscure. Dujardin-Beaumetz, Damaschino, Lechandel, and Cantani say that in these cases we have to deal with a paresis of the muscular tissue of the stomach. Oser, of Vienna, considers this form of dilatation to be a mechanical distention caused by excessive quantities of liquid and of gas. Grisolle states that distention of the stomach can result apart from any appreciable alteration or stricture of the pylorus. Luton and Kussmaul try to explain the dilatation by a spasmodic constriction of the pylorus, of a reflex nature, or consecutive to an ulceration, though so insignificant that it cannot be discovered at the autopsy.

We do not know whether a true paresis or paralysis of

the muscular tunic of the stomach in cases of dilatation has ever been observed. Our own observations prove to us the contrary, that dilated stomachs are endowed with an extreme excitability. The slightest irritation in the gastric region is sufficient to provoke strong peristaltic contractions. Kussmaul has observed the same fact in cases of neurosis and where an exalted excitability of the gastric nerve system existed. This celebrated German clinician considers these peristaltic movements as the cause of this form of gastric dilatation. We accept his opinion for the following reasons. The muscles of the stomach are arranged in such a way that we have in the pylorus, in the "cravate suisse," and in the cardia certain layers of muscle that are stronger than the other muscle of the stomach. Supposing an exalted irritability of the muscular tissue of the stomach arises from some cause or other; spasmodic contractions of all the gastric muscles will be seen to supervene. But since the pylorus and the "cravate suisse" are much more powerful than the other muscles, the stomach, in contracting, will not be able to overcome the occlusion of the "cravate suisse" or of the pylorus, and cannot expel its contents. The fatigued muscles become distended under the weight of the contents of the stomach and dilatation will be thus effected.

How does massage act in these cases? According to the writings of Zabloudowski and others, we know that under the influence of massage a fatigued muscle regains its strength much sooner. Massage will act first by restoring the contractility of the muscular tissue. Then, by adding to the force of the contractions of the stomach that of manual pressure, we shall succeed perhaps in overcoming the spasmodic contractions of the "cravate suisse" and pylorus, and thus in emptying the stomach of at least a part of its contents.

Besides these mechanical effects of massage, we must also admit that it will also act favorably on the abnormal irritability of the muscular tissue of the stomach and will aid in diminishing spasm, of which, moreover, we do not know the true cause; for the minute hypothetical ulcerations of which Kussmaul speaks have never been seen by any one.

The question has often been discussed, Can dilatation of the stomach be cured?

Our own observations are yet too few in number to enable

us to enter fully into the discussion of this subject, but we declare that in two cases of manifest dilatation we have obtained by massage not only the disappearance of the digestive troubles and of the nervous phenomena, but also of the physical signs of dilatation.

Our first case is that of a distinguished physician of the faculty of Paris, and the account of the case which we publish has been written by himself. We can follow step by step the development of his disease. The effects of massage in this case are striking.

We may say the same thing of Case II. We have made no change in the treatment the patient had followed for several months; we have simply added thereto daily sittings of abdominal massage, each lasting twenty minutes. The result obtained should also be attributed to massage alone. In the other cases of dilatation of the stomach we have not noticed any diminution in the volume of the organ, but this failure is of no very great importance.

These were cases of manifest phthisical subjects, and for that reason alone refractory to any treatment. In other cases the treatment was not continued long enough to warrant their being taken into consideration.

Before leaving the subject of dilatation of the stomach we wish to say a few words on that curious form of gastric dilatation in which the patients suffer from no disorders of digestion. These are neurotic patients who present the general symptoms of nervousness and hypochondria. Bouchard states that the symptoms presented by these patients depend on an auto-intoxication, following a stagnation and fermentation of the food in the stomach. Looking at such cases from this standpoint, there would be considerable advantage gained by overcoming this stagnation; and we believe that abdominal massage ought to be extensively employed in the treatment of such cases.

Next to dilatation of the stomach, cases of nervous gastritis give excellent results from treatment by massage.

Case III. is the most brilliant demonstration of this fact. Here we have a patient who had fallen to the lowest degree of weakness, who could not even retain milk, and vomited every kind of food. She had arrived at such a degree of cachexia that she was sent to us with the diagnosis of cancer of the

stomach, and thanks to methodical massage we see her little by little regaining her strength. She commenced by being able to retain liquid food the consistency of which was gradually increased. On leaving the hospital she had gained 24 lbs. in weight. She is now in good health, and eats like a healthy person.

We think this is all that can be asked of any therapeutical agent.

As our cases prove, abdominal massage, especially in its superficial or light form, can be employed with advantage in all gastralgic attacks, excepting when they are due to an organic lesion of the stomach, and in reflex phenomena, as in hiccough, various convulsive fits, vaso-motor phenomena, etc. It would be presumptuous and even premature to suppose that in all similar cases results equal to those we have observed in our patients will be obtained. We only wish to say that, for such cases, it will be well to advise abdominal massage.

A very frequent disease, and one in which we have obtained very good results by massage, is chronic gastritis. In these cases massage always soothes the patients, and employed some hours after eating it always relieves their painful sensations, such as heaviness, heartburn, regurgitation, etc. We need not repeat in what manner massage acts in these cases. We have treated this subject at length in the physiological part of our essay.

In conclusion, we should add that dyspeptic and chlorotic patients may likewise be treated with advantage by abdominal massage. Here massage will act directly on the cause of the disease—anæmia.

The diseases of the stomach in which massage is absolutely contra-indicated are chiefly those in which gastric hemorrhage is to be feared. Consequently it should not be performed in cases of cancer, of round ulcer; in a word, in diseases of the stomach accompanied by ulceration.

Acute and febrile diseases of the stomach will likewise form a contra-indication. In these cases it will be well to respect the old rule of rest to inflamed organs.

CHAPTER V.

INFLUENCE OF ABDOMINAL MASSAGE ON DIURESIS.

It was by mere chance that we discovered the diuretic effects of massage of the abdomen. One of our patients complained that after the first massage of his abdomen he had to micturate copiously and frequently. We watched him attentively and ascertained that he had a true polyuria, passing daily as much as ten pints of urine, which was clear, of low specific gravity (1.002), and contained neither albumin nor sugar. We then stopped the massage treatment and the urine gradually diminished in quantity. The daily quantities were: 8¾ pints, 6 pints, 6 pints, 5 pints, 3½ pints. For some days the quantity varied between three and six pints. Without changing the patient's diet we subjected him once more to abdominal massage, and again we observed a gradual increase in the quantity of urine excreted. The days following massage the patient passed successively: 5 pints, 4¾ pints, 4¾ pints, 7 pints, 9 pints, 9 pints, 10 pints; five quarts being the maximum the patient passed in 24 hours. Moreover the patient was scarcely aware of this increase of diuresis. The only thing which troubled him was that he had to rise often during the night.

We made further experiments in this direction, and here is the summary of our observations: In all our patients, with few variations, it may be demonstrated that under the influence of abdominal massage the daily quantity of urine is increased.

We were obliged to forego the very interesting study of the chemical modifications which the urine undergoes in these cases. It would have been necessary to determine the quantity of nitrogen contained in the food consumed by the patient, then the quantity contained in the fæces and the urine, in the form of urea, uric acid, and salts. These chemical investigations are very laborious, and in order that they may be of some scientific value, they require special conditions, and a rigor-

ous supervision of the subjects of experiment. The hospital is not a very convenient laboratory for investigations of this nature, for one is never certain that the patient carries out all the details which are necessary to give accurate results. Consequently we leave this important side of the question to more competent observers in this mode of investigation and limit ourselves to the statement of the one fact regarding the increase in the quantity of urine. This fact is undeniably very interesting from a physiological point of view, and exceedingly important for pathology.

In our historical introduction we have already said that the diuretic effects of abdominal massage have remained quite unknown up to the present day.

The works of Bela-Weis, and of Gopadze, have taught us that general massage has an undeniable influence on nitrogenous metabolism and that it increases the quantity of urea excreted in 24 hours. Lastly, Burn, of Vienna, has published a very interesting paper on the influence of massage of the posterior extremities of animals on the increase of diuresis. The only essay on the influence of abdominal massage on diuresis is that of Poloubinski, published in "Vratch," No. 22, 1889. This author seems to have overlooked our essay in the "Bulletin de Thérapeutique." He discovered independently that abdominal massage increases the daily quantity of urine.

Our experiments were made in the following manner. First of all, the quantity of urine passed by the patient in 24 hours was measured. This having been determined, he was subjected to abdominal massage for from twenty to thirty minutes. The method was that described above under the head of deep or strong massage.

The increase in diuresis did not manifest itself immediately after the operation and varied with the cases One patient passed a great deal immediately after the operation, while this result occurred in another one or two hours later; in a third it was only during the night that he passed an increased quantity of urine, and was obliged, contrary to habit, to get up several times.

Increased frequency of micturition is not the only thing observed. We insist on this point, since, according to Preyer, it appears that in certain conditions the frequency of micturition alone may act as a diuretic. We shall refer to this fact

again. In our patients, the quantity of urine passed at each act of micturition was equally increased.

The diuresis increases gradually with the number of operations of massage. Thus one patient who habitually passed from three to three and three-fourth pints of urine, passed after the first performance of massage four pints. Sometimes the first sitting had no influence, and it was only after the second, and even after the third, that an increased secretion was manifested. Then, if the massage of the patient be repeated every day, the quantity of urine voided in twenty-four hours gradually increases. For example: 4 pints, 4¾ pints, 4⅞ pints, etc. A maximum is at length reached, which varies according to the individual, and is rarely exceeded. This maximum is sometimes four pints, but may rise to 10 pints daily. After ceasing massage, diuresis gradually decreases, the daily measurements falling from 4 pints to 2⅓, 2⅔, 2⅓, 1¾ pints. According to Poloubinski, the increase depends on a more active absorption of the liquid contents of the alimentary canal. He bases his opinion on the investigations of Mosengeil, Zabloudowski, and Reibmayr, who have proved that massage favors absorption. We do not consider this hypothesis sufficient to explain the increased diuresis. In fact, if this increase were but the result of absorption, it should become manifest only after the operation, and should not continue subsequently. However, the results we have obtained prove that the function of the kidneys is stimulated, because we have observed phenomena analogous to those produced by any other powerful diuretic.

Professor Preyer, of Berlin, states that the frequency of micturition alone stimulates renal secretion. He goes so far as to say, plainly, that frequent micturition acts as a diuretic. It is possible that massage may directly excite the bladder, and in this way cause frequent micturition. But the diuretic effects of abdominal massage do not stop here, since, as we have said above, it is not only the number of micturitions that is increased, but the quantity of urine passed at each act is also greater than in the absence of massage.

Abdominal massage stimulates the activity of the kidneys even in different ways. Physiology teaches that increased blood pressure causes increased diuresis. On the other hand, stimulation of the splanchnic and pneumogastric nerves be-

low the diaphragm also causes increased diuresis by producing renal congestion (Claude Bernard). By a series of experiments performed by Glovetzki it has been shown that under the influence of abdominal massage blood is directed toward the internal organs; that the blood pressure is increased during its performance and some time afterward; that the heart beats are accelerated, and that the pulse becomes fuller. We have nothing to add to this. Abdominal massage produces various phenomena which are of great importance, for each one of them is capable of causing increased renal activity.

The therapeutical applications of abdominal massage as a diuretic have not yet been sufficiently studied to warrant entering into the details of this important matter. The indications and contra-indications have not yet been established with satisfactory precision.

We have obtained very good results from abdominal massage in patients suffering from uncompensated heart disease and diminished diuresis. Abdominal massage, especially when combined with a milk diet, is indicated in all cases in which we wish to hasten reabsorption of exsudations.

Massage may be employed with advantage in cases where the kidneys require careful treatment, and in which other chemical diuretics are contra-indicated.

CASE I.—V——, a physician, aged 36, born at Porto Rico. On his return to that country (1879) he suffered from intermittent fever, but since that time he has enjoyed excellent health. He had contracted syphilis in Paris in 1878, and believed himself cured after a severe treatment extending over three years. In 1885 he had another attack of intermittent marsh fever which lasted over a month, and proved very obstinate to quinine and arsenic. About the same time in the following year he was again attacked by the same prolonged and obstinate fever which lasted nearly two months. Apart from this his health was perfect.

In October, 1887, he was imprisoned for political reasons in a fortress on the borders of the sea in an excessively humid embankment. There he had an attack of fever with chills of the extremities. In spite of quinine the fever persisted. At the end of six or seven days he discovered all the symptoms of hepatic congestion: pain, increased by pressure, in the he-

patic region, obstinate constipation, icteric tinge of the conjunctiva, enlargement of the liver, which reached an inch and a half below the false ribs, enlargement of the spleen, pulse 50 per minute. Despite appropriate medical treatment this state continued until he left the prison. He lost weight from 150 to 135 pounds. Congestion of the liver persisted with all its symptoms. In April, 1888, he left the country and came to Paris. During the first two weeks of his residence in Paris his health greatly improved, the fever ceased, his appetite and strength returned.

He left for Vichy, where Dr. S—— discovered dilatation of the stomach which descended to 1¼ inch below the umbilicus. There was a great deal of gurgling. The stomach was washed out every morning. The diet consisted of milk.

There was obstinate constipation; the bowels acted only in response to enemata and cholagogue purgatives. But his general condition gradually improved. The vertical measurement of the liver was 9 centimetres, that of the spleen 7, weight 190 lbs. Left Vichy August 27th and returned to Paris. Continued to wash out the stomach and kept up the milk diet. Cold water douches were administered twice daily. His general health not improving, he consulted Dujardin-Beaumetz, who referred him to Dr. Hirschberg. He was subjected to abdominal massage in November. The first three or four sittings produced no notable results, but after the fifth day the evacuations grew gradually more regular. The stomach retracted, gurgling became inaudible, the appetite returned, and diuresis became abundant. To-day (December 23d), the inferior border of the stomach, which was 1½ inches below the umbilicus, remains above that line.

In the morning before breakfast there is no gurgling, and very little in the evening. The evacuations are almost normal. The liver is normal, the spleen but little engorged. The patient eats of everything with a good appetite.

Case II. Ch. B——; aged 17; mother died of phthisis; she was a nervous person and suffered from cramp of the stomach. Father alive; has also had cramp of the stomach during the past six years. The patient's disease commenced a year previous to consultation by sensations of burning at the pit of the stomach, especially when fatigued. At first his appetite was good, even exaggerated. There were eructations,

a bad taste, like rotten eggs, in the mouth, especially in the morning.

The patient is a tall, very thin boy, weighing only 96 lbs. Before his disease he weighed 106 lbs. He is nervous and hypochondriacal. He has globus hystericus which appears and disappears on pressure on the epigastrium. Lungs and heart healthy. He complains of lack of appetite. After eating there is a sense of weight in the stomach, of gastric distention, burning in the stomach and globus hystericus which suffocates him. These phenomena last from one hour to one and a half hours after liquid food, and five to six after solid. On percussion, the stomach is found to be dilated. The inferior border descends to within one inch and a half of the umbilicus. Above this line, gurgling is found very pronounced everywhere. The nodosities of Bouchard are present. Constipation. The urine contains neither sugar nor albumin.

From February 15th until May 29th, the state of the patient remained about the same; during his stay at the hospital he lost about 2 lbs. All this time he took only liquid food, and his stomach was washed out by the stomach pump.

May 29th he came under my treatment.

At the beginning I found several times that two eggs remained four hours in his stomach; 1 pint of milk, soups, beef-teas, 7½ hours; six ounces of roast meat, well mashed, 7½ hours. If the patient took, at a meal, one ounce of bread, traces of it were found eight hours afterward in the liquid taken from the stomach.

This having been ascertained, I commenced massage for one-half hour every day, sometimes at 9 o'clock, after the patient had taken his milk, sometimes in the afternoon, three or four hours after a meal, which consisted of 200 grammes of meat.

From the beginning of the massage treatment the patient affirmed that the painful sensations which he had experienced after eating disappeared after massage. Yet the first sittings appeared to have no influence in shortening the retention of food in the stomach. It was only after the eighth sitting that I noticed that milk had passed through the stomach in three hours, and that six and a half hours after a meal composed of six ounces of meat only a few traces of it were found in the liquid taken from the stomach. Massage was suspended for

a few days. During these days I continued to use the stomach pump, and found:

June 15th, one pint of milk at 7 o'clock in the morning. Stomach pump at 10. I drew from the stomach 4 ounces of liquid.

June 16th, 6 ounces of meat at 11; 6½ hours later I withdrew 1¼ ounces of it.

June 17th, at 7 in the morning, one pint of milk; three hours later 7 ounces of liquid were removed from his stomach.

The stomach pump and massage were continued daily until July 20th, when I found that three hours after liquid food and six and a half hours after meat the stomach was empty. The general health of the patient is much improved. At this date (July 20th) the stomach empties itself of liquid food in three hours and of solid food in six hours, without having recourse to massage. He has gained four pounds in weight. The physical signs of dilatation have in great part disappeared.

Diuresis.—The daily quantities previous to massage were 2, 1¾, 1⅞, 2⅓, 2¼ pints. During massage, 3, 2½, 2¾, 3⅓, 3¼, 4 pints. While massage was suspended, 2¼, 2¼, 2⅓, 2, 1¾ pints.

CASE III.—Mme. B——, æt. 41, entered the Hôpital Cochin November 2d, 1888, under the care of Dujardin-Beaumetz.

At the age of 11 she had typhoid fever. Three years afterward she had pleuritis. After this last disease she remained feeble, though otherwise in good health. At this time she also suffered from hepatic colic. Fifteen years ago, after the death of her mother, she ate little, but did not suffer from her stomach. Only fifteen months since she began to suffer from vomiting and weight in the stomach. Vomiting came on from three to four hours after meals and relieved her greatly. Afterward she was hungry and ate and drank a great deal. She declined gradually. Her sleep was restless, and she became irritable. In this state she was referred to me with the diagnosis of cancer of the stomach.

Present state: Patient is weak and weighs only 64 lbs. Heart and lungs normal. Examination of the stomach demonstrates that its inferior boundary extends ¾ inch below the umbilicus. The stomach is painful to pressure. Obstinate constipation. Amenorrhœa.

Treatment: Abdominal massage two hours after breakfast

every day. Diet consisted of milk and oatmeal water, equal parts, several times daily.

After the first few operations the patient experienced much relief and gained strength. Digestion proceeded with more ease. Gradually the quantity of food was increased; at first Kemmerich's peptone with pure milk was most easily retained, then toast, then hashed roast veal. By the end of January the patient digested the ordinary hospital diet; she felt better and weighed 88 lbs. The evacuations were regular and normal. Massage was performed only thrice weekly, and ultimately suspended.

The patient left the hospital on March 4th quite cured, at which time she weighed 90 lbs.

MORBID BLUSHING;

ITS

PATHOLOGY AND TREATMENT.

BY

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MORBID BLUSHING.

CHAPTER I.

BLUSHING.

MORBID blushing—a term which I hope to justify—is, like flushing, a symptom. It is, however, of sufficient practical importance to the physician to merit independent study. So far as I know, only one writer—Burgess, who wrote in 1824—has dealt with this subject, and even his monograph is almost entirely devoted to the physiological aspect of the question.

The treatment of flushing and morbid blushing resolves itself into the treatment of the nervous conditions underlying them. I have therefore embraced this opportunity of setting forth what I conceive to be the general principles which should guide us in the treatment of functional nervous diseases in general.

Justification of the Term "Pathological Blushing."—It is necessary at the outset to justify the somewhat clumsy term, "pathological blushing." It may be thought that the phenomena of simple blushing can have little or no interest for the physician, but that this is an erroneous idea, founded on an imperfect conception of all that blushing may entail, a very brief reflection will suffice to show. If it hampers the individual in his commerce with the world, if it causes him to shun society, to seek solitude, to lead the life of a recluse—and it may do all this—then it is essentially pathological in the true sense of that word. At the best it is no very agreeable experience, and every one (except perhaps the accomplished coquette) would, I suppose, suppress a blush were it possible to do so. It is not, however, by any means generally realized how much misery an inordinate tendency to blush may cause.

Even the strongest-minded individual is placed at a considerable disadvantage if he becomes at any time liable to color on the slightest provocation; while with the nervous and self-conscious—and intense blushers are usually both—such a predisposition is not only embarrassing but distressing and harassing in the extreme, handicapping the unfortunate subject at every turn. For the blush is the external sign of an inward working of the mind; it betrays that which one would be at great pains to conceal; the strongest effort at self-control is powerless to hide this glaring testimony to the inner thought. The blusher involuntarily reveals himself to others, and the knowledge that his discomfiture is patent to all makes his confusion worse confounded. To those whose avocation brings them much into contact with their fellow-men the fate of the inveterate blusher is peculiarly hard. He lives in constant dread of making an exhibition of himself; often enough he is unable to carry on his business, and though he tries a new one, it is only to be compelled to abandon it also for the like reason. Thus he may go from place to place, seeking comfort and finding none; he is, as I once heard a patient put it, "crippled in every direction." Who, then, will doubt the existence of true pathological blushing?

Dubois[1] observes that the continual dread of blushing renders the inordinate blusher "absurdly timid and shy: he avoids every occasion of coming forward; he seeks solitude; social and sometimes professional duties become horribly painful to him; his life is literally ruined by a trifle—(brisée par une niaiserie)."

The following cases show the hampering effect of excessive blushing:

Man, æt. 25. Tea-taster. Robust health; total abstainer from birth; his only ailment, uncontrollable blushing which "causes him discomfiture at every turn;" he lives in constant dread of appearing absurd.

Man, æt. 27. Was a soldier, but compelled by excessive and constant blushing to abandon his profession.

Man, æt. 33. Unmarried. Formerly in the navy; physically strong and courageous. Has just had to give up the post of prison-warder through inordinate blushing, which, he says, has lost him many good chances in life.

Man, æt. 28. Has recently had to give up the study of medicine through excessive blushing.

Man, æt. 19. Chemist's apprentice. Blushes frightfully when standing behind the counter serving customers; will have to seek some other occupation if not relieved.

Man, æt. 32. Minister. Is so afflicted by blushing that he has latterly entirely given up duty.

Woman, æt. 27. Nervous; considers blushing her chief trouble. It has, she says, quite spoiled her life.

Man, æt 27. Musician. Has been offered an appointment as bass singer in a cathedral choir, but is afraid to accept it on account of his blushing.

Man, æt. 30. Draper. At times, owing to blushing, it becomes a fearful ordeal to transact the most ordinary matter of business with strangers, or even with acquaintances.

Distinction between Flushing and Blushing.—The more closely one studies the phenomena of blushing, the more impossible does it seem to distinguish it from flushing. The only safe criterion of difference lies in the exciting cause: A blush always arises from emotion, a flush only occasionally. And whereas the mental states which induce blushing consist, as Darwin observes, "of shyness, shame, and modesty" alone, the essential element in all being self-attention, a flush may arise from any emotion causing sudden nervous agitation.[2] When an individual, then, becomes red in the face from any of these three causes he may be said to blush. They all imply "a sensitive regard to the opinion, more particularly for the depreciation of others, primarily in relation to our personal appearance, especially of our faces; and secondarily, through the force of association and habit, in relation to the opinion of others on our conduct."[3] Of the three, shyness is by far the most common cause. A person, to quote Darwin again, will blush a hundred or even a thousand times from this cause to once that he blushes from shame—that is to say, from a sense of blame. Many of the writers who have touched upon the subject of blushing appear to regard shame as the chief exciting cause, but I think this is probably because they have not clearly distinguished between shame and shyness. Pathologically, however, it is very necessary to keep the distinction between the two in mind, for blushing from shame is normal

and legitimate, while blushing from shyness, except in the young and inexperienced, can scarcely be regarded as so, certainly not in its exaggerated forms. Darwin points out that the word shyness in many languages is etymologically related to the word fear, thus showing that the opinion is widely, even if unconsciously, held that shyness and fear are closely related. In like manner I find that writers have been struck with the likeness between shame and fear. The analogy between the effects of the two did not escape the keen observation of Aristotle;[4] and Oken[5] maintains that shame is only a degree of fear.

The close connection between shame and blushing is brought out in an interesting way by the fact that in Swedish the one word (blygsel) indicates both; similarly, in German, "Schamgefühl" may be used to denote either the sense of shame or the blushing which it provokes. The shame which causes blushing may, according to Darwin, result from two causes, viz., from actual crime, or from a breach of etiquette. It should further be mentioned here that modesty embraces two essentially distinct mental conditions, namely, humility and the emotion provoked by any indelicacy. In popular language modesty is also often used as synonymous with shyness, but this use of it, following Darwin, I have avoided.

CHAPTER II.

CAUSES OF BLUSHING.

HAVING seen that the essential difference between flushing and blushing lies in the exciting cause, we may now at once proceed to consider the causes of blushing.

Inasmuch as self-consciousness is the essential mental condition underlying blushing, I propose to subject it to a somewhat careful analysis, and before doing so it is advisable to make some observations on the division of consciousness into subjective and objective, because, as we shall see, the recognition of this division has an important practical bearing upon treatment.

Consciousness, Subjective and Objective.—The term consciousness needs no definition. All mental states are included under it: every sensation, emotion, intellectual operation, every act of willing is, so far as it obtrudes itself upon the ego, an act of consciousness.

Consciousness is frequently described as of two kinds—subjective and objective. Purely subjective consciousness is, I take it, consciousness into which ideas of an external world do not enter. When the mind is wholly occupied with some feeling or feelings detached from all material associations it is said to be in a purely subjective state; thus when a diffused sensation of heat is felt and not distinctly referred to any part or parts of the body, and not associated with any external object, the consciousness is said to be essentially subjective; but directly the sensation is distinctly localized, above all, directly it is connected by the mind with some "thing" external to the body, the consciousness is said to be objective. The distinction between these two forms of consciousness is, however, more or less artificial; *i.e.*, there is no essential difference between the consciousness of an external object (perception) and subjective consciousness as above defined. Only those who do not realize the fact that we can know nothing what-

ever of anything outside of, or apart from, mind could doubt for one moment the truth of this statement. We can think of a material world in terms of consciousness only, and our consciousness of an external world is radically of exactly the same nature as subjective consciousness, using the term in the above sense.

Subjective consciousness, as thus defined, takes no account of complex thought processes, but refers simply to feelings which are detached from all material associations. But the term subjective, as opposed to objective, consciousness is in ordinary language used in a wider sense. (Unfortunately the two terms are very loosely used by writers.) When an individual is so completely wrapped up in his own thoughts, to use the popular expression, that the external world is dead to him, he is said to be in a subjective state, but directly he becomes conscious of an external world, directly the sensations resulting from the operation of various external forces upon his end-organs distinctly obtrude themselves upon his consciousness, and are referred to the external world (or perceived), he is, so far as they are concerned, in an objective state, and directly they engross his entire attention, so that his thoughts go out actively to them, his mental attitude is said to be essentially objective.

As a matter of fact, however, the individual who is wrapped up in his own thoughts who is, in quasi-popular language, in a subjective attitude of mind—is also to a large extent objective. Subjectiveness of thought is, in fact, always largely linked with an objective element. This must be the case whatever train of thought the mind is pursuing, since all our ideas are necessarily in the first instance objective: they originally came through the senses, and they cannot be completely disassociated from impressions derived from without, even in the most abstract processes of thought.

Thus when an individual sees a brick he is in an objective state of mind. But so also is he, as Hughlings Jackson observes, when he thinks of one. The difference is not one of kind, but of degree, when he thinks of a brick the nervous system is agitated in the same way as when he actually saw it, though in a lesser degree. And thus supposing the individual above referred to to be wrapped in thought on some of the affairs of every day life his horses, his dogs, his business, his home—

his mind will be in practically the same condition as if he were actually experiencing that which he is recalling or imagining; that is to say, his mentation is essentially objective, for his thoughts go out to the object world. Similarly, an individual reading a realistic narrative may almost be said to witness—more especially if he have a vivid imagination—the scenes and events which are depicted. It would obviously be a purely artificial distinction to speak of the mind as subjective in the one case, and objective in the other.

When, however, the train of thought pursued is abstract, as when a mathematical problem is thought out, the objective element in it is less evident, it is so disguised as to be almost ignored. Nevertheless, the numbers and symbols employed in such thought, are essentially derived from the objective world. We may, therefore, speak of different degrees of objectivization in mentation. During mathematical calculations the objective element is slight; in reading a vivid narrative, or in vividly recalling an actual experience, it is much stronger; in actual perception it is strongest.

Self-consciousness.—Self-consciousness is sometimes used in the sense in which Hughlings Jackson employs the term subject-consciousness, that is to say, to denote the "awareness of our existence as individuals." This, as I understand it, is practically the same as consciousness of the ego; *i.e.*, the various mental states occurring in connection with one organism are felt as belonging to one individual; they are unified under one personality, and this sense of individuality—this "Ichheit"—which is ever present, no matter what change consciousness undergoes in objectivization, is subject-consciousness.

"Subject-consciousness is the comparatively unchanging, the most unchanging. It is thus a contrast to object-consciousness, which is the continually changing" (Hughlings Jackson, *ibid.*, p. 7).

Subject-consciousness in this latter sense is sometimes spoken of as self-consciousness. I shall, however, use the latter term in a wider sense—to connote, namely, not only the consciousness of a mental individuality or ego, and of such an individuality joined to a material body, but self-attention also, whether as regards body or mind; that is to say, to include the critical contemplation by an individual of his body,

and of his mental self—of his past life, this moral responsibility, his future destiny (=introspection). Such self-consciousness (self-attention, it might more properly be called), though resting upon subject-consciousness (in the sense in which Jackson uses this term), which, indeed, is at the bottom of all knowledge, is yet something more. In self-consciousness the individual scrutinizes his own mental and physical being in much the same way as he would examine and criticise the physical and mental attributes of another individual, and forms a good, bad, or indifferent opinion of his own moral, intellectual, or physical being from the standpoint almost of an outsider. The difference between subject-consciousness (or the mere sense of a distinct personality) and self-consciousness (or self-attention) will perhaps be made clearer by the following considerations.

Up to the age of two or three there is little or no self-consciousness, but there is, of course, subject-consciousness, or awareness of individual existence. The child does not at this early age bend the mind in upon itself, and contemplate its past, present, or future; neither does it direct distinct attention to its body and form an opinion upon that. Nevertheless it has a distinct mental ego. The same is true of the dog and other animals high in the scale, which, although of course possessing conscious individuality, are endowed in only a slight degree with self-consciousness. It is thought by some that self-consciousness begins in the child when it ceases to speak of itself in the third person and substitutes the pronoun of the first person for its proper name. The acquisition of language by the child is on the same lines as its evolution in the human race, and it is possible that the first appearance of the personal pronoun in the evolution of language—whether in the race or in the individual—marks the first appearance of a well-defined self-consciousness. It is certainly an interesting fact that in the growth of language pronouns were of somewhat late origin. I am convinced, however, that distinct self-consciousness exists in the child before it speaks of itself in the first person. The young child uses no pronouns at all, but will call its parents and its nurse by their names simply because it constanty hears these used and gets into the habit of associating them with the persons, as also its own name with itself—an amply sufficient reason for its always speaking

of itself in the third person. With advancing years, however, the child becomes distinctly self-conscious, and undoubtedly —as Sully observes[7]—the first germ of self-consciousness is concerned with the material body. The full self-consciousness of a mental individuality comes later. Self-consciousness directed to the body is therefore of a much cruder nature than that which is directed to the mental self, and it may be very strongly developed in the weak-minded. Whatever self-consciousness the lower animals possess is chiefly of this nature. Thus a swan or a peacock is certainly to some extent physically self-conscious. "It is," writes Anstie, "with the age of puberty that self-consciousness begins to be a feature in the mind of the young, and its appearance marks the entrance of a dangerous element into the character. The mental antidote to its possible evil effects is to be found in a vigorous (but not excessive) training of the mind in studies which shall be as far as possible external, and the discouragement of all tendencies to introspection."[8]

We may conveniently classify self-consciousness as follows:

Self-consciousness directed to the body. { *a.* To external appearance. *b.* To bodily functions.

Self-consciousness directed to the mental being = introspection.

Self-consciousness Directed to the Body.—a. To external appearance. An individual who possesses in excess this kind of self-consciousness is apt to think too much of his personal appearance, and when such is the case he always fancies that others are equally interested in it. When in a public thoroughfare or assembly, he imagines himself the observed of all; and what he thinks of himself, such he believes others are thinking of him. If he is pleased with himself, he will fancy that others are gazing upon him admiringly; if he holds an unfavorable opinion of himself, he will imagine that they regard him in a disparaging or, it may even be, in a ridiculous light. In either case self-consciousness, being excessive, is abnormal—in the former, ethically abnormal, and of little interest to the physician as physician; in the latter, pathologically abnormal, and therefore of importance to him. The individual who is vain of his personal appearance may enjoy sound nervous health, but he that is for ever imagining that

does not affect covered parts of the body, while in races who habitually go unclothed, or partially unclothed, it is much more widely spread, is in favor of this view, for among the latter self-attention is not strictly confined to the face. The following case also supports Darwin's view in a most singular way:

Man, æt. 29. Is very liable to blush at dinner; if talking to a person at his side will blush on this side only!

No doubt Burgess and Hagen are right in attributing the vaso-motor susceptibility of the face in some measure to the fact of its constant exposure to variations in temperature; but this susceptibility is not of itself sufficient to explain the all but constant limitation of the blush to the face and adjoining parts, for, as Darwin observes, the hands which are equally exposed to alterations of temperature are but seldom implicated in true blushing.[10]

b. To bodily functions. The individual who is continually contemplating his own body is also apt to pay undue attention to its various functions, and to be perpetually asking himself whether they are going on normally or not. He examines his tongue and his secretions, and by giving undue attention to the various aches and pains which may almost be said to be inseparable even from health, he increases them tenfold. This concentration of the attention upon various parts of the body produces a change in their functions, and he may in this way bring on actual disease. This form of self-consciousness belongs to the hypochondriac, and it is practically always associated with an undue tendency to introspection. How far such individuals are self-conscious as regards personal appearance I am unable to say, but I am on the whole inclined to think that they are generally abnormally self-conscious in this respect also.

Self-consciousness Directed to the Mental Self—Introspection.—As the child waxes older he becomes more definitely conscious of possessing a mental individuality. He begins to contemplate himself as a thinking, willing, and feeling being; he is capable, that is to say, of scrutinizing and criticising his mental self, of approving or condemning his thoughts and conduct, of gauging his intellectual capacity, of contemplating his past history, and reflecting upon his future destiny.

Now, self-examination, if kept within judicious bounds, serves a useful purpose, but if it transgress these limits it may do more harm than good. No one can doubt the beneficial results of keen and searching self-scrutiny, but, necessary though it is, it may be carried too far: here, as everywhere, safety lies in the "golden mean," perhaps, in this case somewhat harder to find than in some others. Self-examination is a process which easily deteriorates into morbid self-analysis, and instead of fostering the formation of a lofty character may, carried to excess, suck at the springs of life and produce a self-engrossed and most undesirable attitude of mind. For this reason I would enter a protest against all such religious methods as tend to foster unduly in the young the habit of turning the mind in upon itself. As the period of puberty—one of the critical periods of life—approaches, mental activity is apt to increase with marvellous rapidity, and, in the imaginative especially, the tendency to introspection develops itself naturally and quite fast enough without any aids from without. To seek to increase it may be to sow the seeds of profound mental disorganization: individuals of tough nervous fibre may bear the strain, but those of delicate nervous organization are totally unable to do so, and though there may be great temptation to impress the mind while it is fresh and plastic, this doubtful gain is obtained at too great a cost if thereby the whole mental and physical being is permanently injured. We should rather seek to check than to foster the tendency to introspection in the young, and to this end the mind should by every legitimate means be attracted away from itself—directed into non-egoistic channels.

Excessive introspection, like excessive attention directed to the body, is characteristic of hypochondria, probably in this condition the functions of the body, and bodily aches and pains, are more absorbing than the nature of the moral and intellectual self. We have seen that blushing results primarily from excessive self-consciousness of body, but it may also arise from an undue self-consciousness of the mental being. The individual may blush because he fancies others are forming an unfavorable opinion of his abilities, character, or conduct—that they can read his consciousness and see him as he sees himself, or that they are ridiculing his acts. If he have a good opinion of his mental self at the particular time he

fancies others are criticising him, he most likely will not blush. When a person blushes before strangers it is probable that it is chiefly on account of excessive self-consciousness of body, for complete strangers are felt to be better able to criticise appearance than character; on the other hand, one is more apt to be mentally self-conscious before acquaintances than strangers, for not only is the good opinion of acquaintances more valued, but they are in a better position to praise the good and condemn the evil in us.

Excessive Self-consciousness of either Kind involves Selfishness.—The individual whose attention is absorbed in self has little time to think of others, and hence the nobler altruistic emotions have small chance of proper exercise and development. The excessively self-conscious man is therefore apt to sink to the level of the primitive man of pre-social times, and his case affords an example of the principle that all disease is dissolution—an undoing of evolution. Excessive self-consciousness is undoubtedly a disease of mind, and the victim of it, sinking from that high level of morality which teaches that one should spend and be spent for others, lives for himself alone—in the language of evolution, he reverts to a former type.

Shyness the great Cause of Pathological Blushing.—In the three mental states inducing blushing—shyness, shame, and modesty—self-consciousness is the essential element. Of the influence of shame and modesty I need say nothing, since blushing arising from these causes is normal: from the pathological point of view shyness is the chief cause. The shy individual is excessively conscious either of his mental or his bodily self, perhaps of both; but such self-consciousness, though essential to, does not of itself constitute, shyness: in order to feel shy he must, for the time being, hold himself in low—or at all events, not in high—estimation. He that has a good opinion of his mental or bodily self is never, while imbued with this opinion, shy. A third element is, however, necessary to shyness, viz., sensitiveness in regard to the opinion of others. A highly self-conscious individual may form a low estimate of himself, and yet, not being sensitive to other people's opinions, will not be shy: he will be simply indifferent. The habitual blusher is always very sensitive, and very prone to take offence. Shyness, therefore, appears (to me) to rest upon three things: *a*, excessive self-consciousness; *b*,

want of self-esteem; *c*, undue sensitiveness to the opinion of others.

Apprehension of Blushing a Cause of it.—Duboux[11] thinks that Darwin has overlooked one important cause of blushing, viz., the fear, apprehension, or dread of it. (Such a dread implies, of course, excessive self-consciousness.) "Suppose an individual to blush for the first time from one of the causes mentioned by Darwin (such as shame or modesty), he is in a painful and humiliating situation when he feels his face thus glowing; he seeks to repress the flush of blood; his efforts are futile and defeat their own ends; the blush only becomes more intense. He is fearful of being again exposed to a similar confusion: the very apprehension and effort to resist cause a blush more intense than that of shame. He now knows that the fear of blushing suffices to excite blushing. . . . The time may, indeed, arrive when this fear will cause him to blush when alone and unobserved." He goes on to say that this influence of dread in causing that which we desire to avoid is not peculiar to blushing. In his own case the mere fear of something or the effort to prevent it tends to cause it; and conversely, the mere wish for a thing or the attempt to bring it about will prevent it, and he gives a number of examples. The following cases bear out the truth of Duboux' remarks:

Woman, æt. 29. Suffers from inordinate blushing. Is not nervous in any other way. Since her seventeenth year, when she had scarlatina badly, has been subject to intermittent albuminuria. The blushing commenced when nineteen. Blushes at breakfast before her own family. At dinner-parties she will sometimes be suddenly seized with a panic that she will blush, and with a strong desire to leave the room. The panic will bring on the blushing. Is not troubled at balls or evening parties in the same way, but very much at afternoon entertainments, especially in her own house.

Woman, æt. 33. Subject to constant blushing. Would not be shy before any one but for this infirmity and the constant dread of an attack.

Examples of Self-consciousness.—All the following instances of self-consciousness are taken from my notes on pathological blushing.

a. Examples of excessive self-consciousness of body:

Man, æt. 40. Mason and builder. Timid and despondent; thinks people are observing him, and in consequence is afraid to meet them in the street; blushes if he thinks he is looked at, but not otherwise.

Man, æt. 33. Has lately become unusually shy; contrary to his former habits he seeks solitude, and dislikes to meet old friends, acquaintances; and strangers in the street; fancies people are watching him and making disparaging remarks on his appearance, or displaying a hostile feeling toward him, although he knows it is unlikely they are doing so.

Man, æt. 29. Foreman builder. Very shy all his life; if he sat forward in church would fancy every one was looking at him alone.

Man, æt. 35. Builder. Has the feeling of being watched.

Woman, æt. 38. Is more self-conscious before her two sisters than before any one else, as she knows they are watching her, and in the habit of talking about her.

b. Examples of morbid self-consciousness of the mental being. I could cite two or three cases identical with the following:

Man, æt. 28. Champion athlete. Always blushes when he thinks "he will make a fool of himself."

The following case illustrates a very common result of this kind of self-consciousness:

Man, æt. 29. Musician. If relating anything, often finds he is thinking more of what the people present may be thinking of him than of his narrative, and consequently forgets what he is talking about.

The influence of active occupation in lessening morbid self-consciousness is shown by the following case:

Man, æt. 28. Curate. Very self-conscious, but the more he has to do and the less time to think of himself, the less he blushes.

Having entered into the subject of self-consciousness in some detail, we may now apply the remarks made at the commencement of this chapter on objective thought. I there

sought to show that there is no fundamental distinction between a so-called subjective or objective mental attitude. When an individual is pursuing a complex train of thought, dead for the time being to the existence of the external world, his mental condition is essentially the same as when he is engrossed in the external world. He may be as unconscious of self in the one case as in the other. Thus we must not fall into the error of supposing that the contemplative as distinguished from the practical man is necessarily the more self-conscious. A deep thinker need not think much about himself—usually he does not; and, on the other hand, a man of action may be self-centred. Nevertheless, the former is more apt to become abnormally self-conscious than the latter, for he has greater temptation to self-contemplation. A self-conscious individual derives benefit from studies which divert the attention from self, and in this way his condition may be bettered by a judicious choice of literature; but undoubtedly the best antidote to self-consciousness is an active, practical life involving free association with others. Nothing more fosters self-consciousness than solitude, for solitude thrusts a man upon himself. Unfortunately, the self-conscious individual is often shy. He therefore seeks to be alone, and thus his disorder feeds, as it were, upon itself.

Voluntary Blushing.—I have heard of one instance of voluntary blushing. This was in a young woman who held a public appointment, and I am told that she was well known to a large circle of people as a voluntary blusher. I have, unfortunately, been unable to trace this case, but seeing that people have been known to stop the beat of the heart voluntarily, and to influence at pleasure other structures which in the vast majority of the community are quite beyond the control of the will, one can well believe that there may be those who can influence at will the cutaneous vessels of the face. Ed. von Hartmann evidently believes that some possess this power, as the following passage shows: "The facility with which many people blush or grow pale according to desire is well known—especially coquettes who lay themselves out to do so (die darauf studieren)." [12]

CHAPTER III.

ADDITIONAL CAUSES OF BLUSHING.

In this chapter I shall give a number of examples of the most common circumstances of every-day life under which morbid blushing occurs.

Blushing usually takes place more readily before strangers than before acquaintances, and before acquaintances than before intimate friends; also it nearly always occurs more readily before one of the opposite than one of the same sex. The following cases illustrate these truths:

Man, æt. 33. Always blushes when he goes into a shop where young women are serving.

Man, æt. 32. Blushes when talking to customers.

Man, æt. 24. Blushes when talking to customers, or if he meets any one in the street; always blushes most readily before women.

Man, æt. 19. Blushes frightfully when standing behind the counter serving customers.

Man, æt. 25. Blushes in the society of women; not of men so much.

Man, æt. 32. Blushes in company, especially if women are present.

Man, æt. 27. About to be married, yet blushes most painfully in the society of his betrothed.

Man, æt. 21. Always blushes before women; he even feels restless and uneasy in the presence of men of effeminate appearance!

Sometimes the tendency to blush is greater before acquaintances than before strangers. As already remarked, the exciting cause is not in both cases the same. This is in some cases because the opinion of the former is more valued, or at all events because there is a greater sensitive-

ness in regard to it. Thus a gentleman tells me that when at school he was always highly nervous when he had to read the prayers before his school-fellows, but felt no embarrassment while reading the lessons in a church where he was little known. Such cases are common.

Woman, æt. 29. Blushes intensely before her own pupils.

Man, æt. 27. Blushes as much before his own family as before strangers.

Woman, æt. 29. Blushes at breakfast before her own family.

Woman, æt. 29. Blushes in the morning when she appears before her aunt at breakfast; also before her pupils.

Man, æt. 31. Even if his wife speaks suddenly or unexpectedly to him the blushing will come on. If his employer, who is very kind and considerate, comes into the office and makes a remark to him, he will blush intensely. He does not blush before his fellow-clerks, seven in number.

Man, æt. 28. Curate. Blushes much in church when he has to officiate before his rector. When the latter is absent and he has to take entire charge of the services, he does not blush so much.

In these last two cases the subjects were apparently highly susceptible before some one person whose good opinion was probably highly valued.

The more isolated the individual, the more he feels himself to be observed; and consequently the more apt is he to blush. It is for this reason that going into a shop, especially if the attendants are of the opposite sex, is so often such an ordeal to the inveterate blusher.

Man, æt. 40. Finds it very trying to meet any one in a country lane when he is by himself; would not be so embarrassed if with some one else at the time.

Man, æt. 50. Very apt to blush if occupying a prominent position in church, but would not blush in the pit of a theatre.

The extraordinary readiness with which some people blush is shown by the following cases:

Man, æt. 44. Has been very shy for upward of twenty

years. He can scarcely face a stranger or a woman without blushing. The dread of this prevents his doing many things. The mere mention of the word will set up a blush.

Man, æt. 28. Telephone clerk. Has been shy from childhood; cannot concentrate his thoughts, and is so nervous and confused that he has the greatest difficulty in facing any one in business. He blushes on the slightest occasion, even when speaking to people through the telephone.

Times at which Blushing Occurs. The Influence of Solitude and Darkness.—Blushing occurs much more readily in the light than in the dark, and in some cases at particular times of the day. Thus—

Man, æt. 29.—Very liable to blush, even before his own family. He never blushes at breakfast; but always at dinner.

Man, æt. 19.—Chemist's assistant. Suffers from uncontrollable blushing; has frightful mental suffering when standing behind the counter serving customers, the blood rushing to his face and making it "look like a fire." This blushing generally begins at about 5 P.M.

The following cases illustrate the fact that darkness, which conceals the face of the individual, is apt to check blushing:

Man, æt. 33.—Formerly a soldier; is bold and strong, but very shy, and an inveterate blusher. During the day cannot on this account meet a stranger in the street, or enter a shop where young women are serving, however necessary and urgent his business. "In the dark of the evening likes to meet young lady friends," as he does not blush then.

Man, æt. 22.—Cannot go into a shop where there are women, or speak to one in the street without intense blushing and confusion of mind. If he meets them in the dusk, or at night in the dark, he does not feel these symptoms.

Man, æt. 24.—Inveterate blusher. Does not blush when alone, or in the dark.

Woman, æt. 29.—Blushes so much that she avoids going into society and keeps much alone. Blushes before her near relations; also before total strangers, at church, and even in an omnibus, but never in the dark.

Woman, æt. 33.—Blush is preceded by a sensation at the

pit of the stomach. If spoken to suddenly in the dark will have the sensation, but no blush.

These cases bear out Darwin's view that self-consciousness directed to the personal appearance is the primary and essential cause of blushing. Necessarily such self-consciousness is much greater in the light than in darkness, for then the countenance is hid and the individual feels safe from observation; he has, in fact, that concealment which he seeks to obtain by manifold movements when he blushes in daylight. For the same reason many shy people would have much less shyness before company if they could wear a mask, for then the face would be concealed. I remember once witnessing an attempt at dramatic representation by a number of boys ranging from twelve to fourteen years of age. When the moment to begin arrived, one or two made a feeble attempt at a start, but suddenly there was a general stampede, only two remaining on the stage, and it is interesting to note that one of them wore a mask while the other had his face blacked. The latter was certainly the braver of the two.

According to Perty,[13] blushing never occurs when one is alone, or in the dark: one must be observed. Similarly, Hagen [14] observes: "Blushing never occurs when we are alone. Any one can prove this for himself. On reading anything that excites the emotion of shame let him look in the glass and (if he is alone) no blush will be seen." He also maintains that blushing does not occur in the dark. "Every one knows at once when he is blushing by the heat which mounts to his face, and a certain feeling of fulness in it. Many personal experiences have convinced me that this feeling never occurs so long as a room is dark . . . from which it follows that blushing does not occur unless one is actually observed."

As a matter of fact, however, blushing may occur in the dark. Darwin instances such cases, and I have met with two or three. It may also occur in solitude. The following are instances:

Man, æt. 33.—Blushes at his own thoughts in solitude or in the dark; often dreams he is blushing. (This case recalls a passage in Addison's amusing essay on "Ithuriel's Spear," *The Tatler*, October 14th, 1710. Ithuriel's spear being of celes-

tial temper, had such a secret virtue in it, that whatever it was applied to, immediately flung off all disguise, and appeared in its natural figure. . . . I could not forbear thinking how happy a man would be in the possession of this spear. . . . These thoughts made very lively impressions on my imagination . . . and produced in me the following dream: I was no sooner fallen asleep, but methought the angel Ithuriel appeared to me, and, with a smile that still added to his celestial beauty, made me a present of the spear which he held in his hand; and disappeared. To make trials of it, I went into a place of public resort.

"The first person that passed me, was a lady who had a particular shyness in the cast of her eye, and a more than ordinary reservedness in all the parts of her behavior. She seemed to look upon man as an obscene creature, with a certain scorn and fear of him. In the height of her airs I touched her gently with my wand, when, to my unspeakable surprise, she fell in such a manner as made me blush in my sleep," etc.)

Man, æt. 25.—When alone, often blushes at his own thoughts, especially if he thinks he has been "making a fool of himself" before his fellow-servants.

Speaking of the effects of darkness and solitude on blushing, Darwin says: "The fact that blushes may be excited in absolute solitude seems opposed to the view here taken, namely, that the habit originally arose from thinking about what others think of us. Several ladies who are great blushers, are unanimous in regard to solitude; and some of them believe that they have blushed in the dark. From what Mr. Forbes has stated with respect to the Aymaras, and from my own sensations, I have no doubt that this latter statement is correct. Shakespeare, therefore, erred when he made Juliet, who was not even by herself, say to Romeo (act ii. sc. 2):

> 'Thou know'st the mask of night is on my face;
> Else would a maiden blush bepaint my cheek,
> For that which thou hast heard me speak to-night.'"

In defence of Shakespeare it may be observed that sometimes a most inveterate blusher will not blush in the dark under the circumstances which during daylight provoke intense blushing, and Juliet might have been one of this class. Further-

more, the speech of Juliet does not necessarily signify that she was not blushing. Strictly speaking, a blush cannot bepaint the cheek in the dark, for the physical conditions which underlie the so-called coloring of an object and which consists of a peculiar commotion of ether waves do not then obtain. But Shakespeare may have been more accurate than he knew.

Morbid Sexual Conditions.—In some of my cases of pathological blushing occurring in men masturbation had been, or was still being, practised, and in these cases probably helped to induce the abnormal tendency to blush.

Very few authors of note have seriously dealt with the subject of masturbation. Sir James Paget who handles it with his accustomed skill finds himself reluctantly forced to the conclusion that masturbation, if not carried to excess, is no more harmful than the natural act—that the evils resulting from sexual excess are one and the same, be the means of gratification what they may, natural or otherwise. The researches of Ultzmann, Curschmann, Kaula and others would seem to show that long-continued and oft-repeated excitement of the male genitals sets up a chronic hyperæmia of the prostatic urethra and prostate; and this is supposed to cause reflex disturbance, just as (so it is argued) disease of the cervix uteri and uterus may. It is pointed out that the prostate and uterus are both very rich in nerves which in each case come from the same nerve-plexus, and further that the prostate is supplied with nerve ganglia and Pacinian corpuscles which are only found in very sensitive tissues. These several facts certainly suggest that any affection of the prostate would be likely to set up reflex disturbance. There is, however, so far as I know, no evidence that the hyperæmic condition of which Ultzmann speaks is more readily induced by masturbation than by excessive connection. So far as the direct bodily effects of masturbation are concerned I think there can be little doubt that Paget's view is correct. I am nevertheless convinced that those who practise this vice are far more apt to injure themselves than others. And this for two reasons. (1) The masturbator is more likely to carry his sexual excesses to an inordinate length than he who gratifies sex naturally. He often masturbates from a very early age, long before the natural process is possible, or at all events likely to be indulged in; and the irritating and exhausting

effects of these early excesses on a rapidly developing nervous system, cannot fail to interfere with its proper evolution. The most inordinate sexual excesses, if indulged in for the first time after full sexual maturity has been reached, can produce no such injurious effects. (2) Masturbation acts indirectly on the body, through the mind, in a manner which the normal exercise of the sexual function does not. For the knowledge that a low, contemptible vice has been practised is apt to prey upon the mind and to foster the habit of morbid self-consciousnses. Many coarser natures are little affected in this way, but those of more delicate nervous organization, and above all those who by nature are unduly self-conscious, may suffer agonies of mind from a contemplation of their conduct. It may happen that such a one overestimates the ill-effects of the practice which, perhaps, he has long since abandoned, and travels through life with the belief that there is an indelible stain upon him, or that he has damaged himself beyond recovery. It is this type of individual who seeks advice in every direction and sooner or later falls into the hands of the charlatan. It should be noticed that such, apart altogether from their having masturbated, offer a favorable mental soil for these morbid beliefs, and it may safely be said of them, that the habit of masturbation, even though it may not have injured the body, has yet indirectly done so through the mind, for it is well-nigh impossible to get a healthy body united to a mind which is morbidly self-conscious. Individuals of this type have naturally a weak nervous system, and above all a defective mental organization, for a mind that cannot escape from the thraldom of a fixed idea is defective. Among healthy persons ideas are continually flowing along the current of consciousness, but each is estimated at its true value; but with the individuals in question one idea obtains the mastery over all others. One of the first evidences of mental deterioration is the tendency to attach undue importance to certain ideas or trains of ideas—there is an upset of that delicate balance among the various ideas which belongs to a healthy and vigorous mind.

There can be little doubt, I think, that masturbation tends to increase self-consciousness. It has been termed the "solitary vice," and a vice that is indulged secretly and in solitude, more especially one which is practised on the body, must

necessarily tend to develop that self-attention which plays such an important part in the causation of blushing and other forms of nervousness.

Wherefore we may sum up the evil effects of masturbation as follows: Owing to its frequent indulgence at an early age, there is premature sexual excitement, and this tends to interfere with the proper evolution of the nervous system. Further the nature of the vice is such that it tends to develop inordinate self-consciousness—a condition of mind which opens the door to a host of functional nervous disorders—pathological blushing among the number.

Apart from moral grounds there are, therefore, distinctly practical reasons why the vice should be strenuously fought against—why urgent steps should be taken to protect the individual against himself. For the tendency to masturbate is instinctive in many boys and a few girls. Many masturbate without being taught—much as dogs, stallions, and monkeys do. The habit appears, in fact, to be common throughout the animal world, and there is little doubt that man inherits the tendency from a far-off ancestor. Such thoughts as these should induce us to take every means to prevent the acquisition of the habit. I do not propose here to describe the various means that should be adopted, but I would point out the importance of taking steps to remove an undue tendency to priapism in a child. Such priapism points to some source of reflex irritation, the most common being a too long prepuce leading to irritation of pent-up smegma, a loaded rectum, but above all, thread-worms infesting its lower parts.

Family History.—An excessive predisposition to blush, like every other mental and bodily peculiarity, tends to be inherited. In the following cases a family history of blushing was volunteered:

Man, æt. 44.—Father, who is over sixty years of age, much afflicted with blushing; also his eldest half-brother.

Man, æt. 25.—Has several cousins, male and female, much addicted to blushing.

Man, æt. 27.—Father troubled in the same way as himself with blushing.

The following remarkable case of inherited blushing was observed by Sir James Paget while examining the spine of a

Man, æt. 40. Mason and builder. Timid and despondent; thinks people are observing him, and in consequence is afraid to meet them in the street; blushes if he thinks he is looked at, but not otherwise.

Man, æt. 33. Has lately become unusually shy; contrary to his former habits he seeks solitude, and dislikes to meet old friends, acquaintances; and strangers in the street; fancies people are watching him and making disparaging remarks on his appearance, or displaying a hostile feeling toward him, although he knows it is unlikely they are doing so.

Man, æt. 29. Foreman builder. Very shy all his life; if he sat forward in church would fancy every one was looking at him alone.

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Woman, æt. 38. Is more self-conscious before her two sisters than before any one else, as she knows they are watching her, and in the habit of talking about her.

b. Examples of morbid self-consciousness of the mental being. I could cite two or three cases identical with the following:

Man, æt. 28. Champion athlete. Always blushes when he thinks "he will make a fool of himself."

The following case illustrates a very common result of this kind of self-consciousness:

Man, æt. 29. Musician. If relating anything, often finds he is thinking more of what the people present may be thinking of him than of his narrative, and consequently forgets what he is talking about.

The influence of active occupation in lessening morbid self-consciousness is shown by the following case:

Man, æt. 28. Curate. Very self-conscious, but the more he has to do and the less time to think of himself, the less he blushes.

Having entered into the subject of self-consciousness in some detail, we may now apply the remarks made at the mencement of this chapter on objective thought. I

dark, one had the peculiar complexion that goes with red hair, and one was florid. According to Burgess, albinos are very prone to blush. He also states that those "with red hair and florid skin, those of sanguine temperament, and those with smooth transparent skin and of consumptive tendency" are usually predisposed to blush.

Tylor[17] alludes to the influence of the complexion in masking or revealing the blush in the following passage: "The difference between light and dark races is well observed in their blushing, which is caused by the rush of hot red blood into the vessels near the surface of the body. Albinos show this with the utmost intenseness, not only a general glow appearing, but the patches of color being clearly marked out. The blush, vivid through the blonde skin of the Dane, is more obscurely seen in the Spanish brunette; but in the dark-brown Peruvian, or the yet blacker African, though a hand or a thermometer put to the cheek will detect the blush by its heat, the somewhat increased depth of color is hardly perceptible to the eye."

CHAPTER IV.

STAGES OF BLUSHING.

FOR convenience, we may divide the blush-storm into three stages:

a. The stage preceding the development of the actual blush.

b. The stage corresponding to the period of the actual blush.

c. The stage following the disappearance of the actual blush.

The term blushing refers, in ordinary language, to a reddening of the face and adjoining parts, in response to certain emotional changes. This local vaso-motor dilatation, like that which occurs in a flush, constitutes, however, but a part, and that a very small part, of what is in its entirety a very widespread and highly complex nerve-storm. When the storm is not severe, the actual blushing may be slight; in the more violent attacks it is usually much more intense. Nevertheless, as in the case of flushing, there is no constant ratio between the severity of the storm and the degree of blushing: all the accompaniments of the external blush may be fully developed, and the nervous system stirred to its very depths, and yet very little blushing may occur; and, on the other hand, an individual may blush intensely without experiencing in any marked degree the usual internal symptoms attending a blush. In the one case we must suppose that, owing to anatomic peculiarities, those nervous processes in the highest centres which underlie the emotions that call forth blushing readily cause dilatation of the facial vessels, while in the other the anatomical arrangement is such that these vessels are much less readily affected.

That the crimsoning of the face constitutes only a part, and not even the essential part, of the general nervous perturbation scientifically designated blushing (for we cannot regard the mere blush as an isloated phenomenon) is shown

by the fact that during this state the facial vessels may undergo contraction instead of dilatation. Thus Darwin records the case of a lady who while experiencing all the feelings peculiar to blushing actually became pale.

Preliminary Phenomena of the Blush.—Sometimes the blush occurs without any very noticeable preliminary phenomena. As a rule, however, it is heralded by distinct symptoms, and in some cases, all the general symptoms of the blush precede the reddening of the face. According to Burgess [18] a peculiar, indescribable feeling of helplessness precedes the blush. The entire body is pervaded with a glow; there is mental confusion, the eyes languish, the head hangs, the heart throbs, the breathing becomes affected, there is a stifled feeling, and the voice sounds changed. My own notes record the following premonitory symptoms. A peculiar feeling at the epigastrium, palpitation, breathlessness, a constriction at the throat, with alteration of voice, and distinct mental confusion or dread.

The sensation at the epigastrium occurring in connection with the blush was remarked by Burgess.[19] He says: "The individual often feels a peculiar sensation similar to the epileptic aura rising from the precordia upward," but he does not mention it as a premonitory symptom. With my patients it always preceded the blush. The following are examples of such epigastric auræ:

Man, æt. 31. The blush is preceded by a knock or rush at the pit of the stomach, and a rapid rising upward of a flush which appears to come from there, and quickly spreads over the face and head.

Man, æt. 25. The attack is preceded by a sudden sensation at the pit of the stomach rising rapidly upward.

In both these cases the aura was strictly akin to the epigastric aura which so frequently occurs in connection with ordinary flushes, and it might well be asked whether they are not both instances of true flushes. That they were simple cases of blushing there can, however, be no doubt, for both patients were excessively shy and self-conscious, and in both, the attacks occurred under circumstances which ordinarily induce blushing—in the second case, simply from thought ("blushed at my own thoughts").

Yet more common among blushers than the epigastric aura is the cardiac aura. In all the following instances the blushing was preceded by some peculiar sensation referable to the heart, *e.g.*, palpitation. Each case was undoubtedly one of true blushing.

Man, æt. 28. The blush begins with, or is slightly preceded by, a peculiar feeling at the heart, followed by palpitation.

Woman, æt. 33. The blush is preceded by palpitation.

Man, æt. 27. Blush is preceded by sharp pain at the heart, with palpitation.

Man, æt. 27. Blush preceded by throbbing of the heart.

Now if during the ordinary emotional states which induce blushing the centres representing the epigastric and cardiac regions are discharged, is it any wonder that in disease these centres should display a peculiar tendency to disturbance; and that auræ arising in the epigastric and cardiac regions should be so common?

In the following case the aura started from the feet and spread upward. I cite it in full in order to show that it was one of undoubted blushing, and to enforce my assertion that it is practically impossible to make any sharp distinction between flushing and blushing.

Man, æt. 32. Formerly a farmer, but now a minister. Robust-looking and in excellent general health. Feels confused on entering company, especially if ladies are present. His greatest difficulty is in his church. He can go through the prayers and reading without difficulty, but when standing up to give out the hymn, which he has to read before it is sung, a feeling of dread comes over him, with a peculiar sensation like tingling, which commences in both feet and quickly passes upward all over him till it covers his face, neck, ears, and head with a burning flush. He is then so confused in mind that he does not recognize the sense of what he is reading, although able to utter the words mechanically. He has such a dread of this occurrence in church that he has latterly entirely given up duty.

Dread. In the case just quoted it will be observed that the patient experienced a feeling of dread. Other patients complained of the same feeling before the attack. Sometimes the

emotional state heralding the attack is vaguer: thus one patient complained that his attacks were always preceded by "panic"; another that he had a "feeling as if the attack were imminent." The feeling of dread is, however, most common. This fact is interesting. We have seen that shyness is the most common cause of blushing, and that it is, as the etymology of the word suggests, closely akin to fear—not necessarily physical fear, for the bravest in physical danger may be very shy, but a condition closely allied to it. We have also seen that shame is closely allied to fear; and such being the case, it is interesting to observe that a feeling of intense dread not infrequently heralds the attack.

In this connection also the epigastric and cardiac auræ become interesting to us. Feelings referable to the heart and epigastrium are very common in strong emotion. In sudden fright, for instance, a knock is often felt at the epigastrium, and the heart—as everybody knows—is peculiarly influenced by emotional states. Few will dispute Hughlings Jackson's contention that the physical substratum of what on the psychical side is an emotion, consists of "nervous arrangements" representing (chiefly) the circulatory apparatus and the viscera.

Breathlessness, inability to speak, and constriction of the throat, all of which are apt to occur in strong emotion, more particularly in the depressing emotions, such as fear, not unusually precede and accompany actual blushing. The two latter preceded the blush in the following case:

Governess, æt. 33. In charge of five children. Highly nervous and emotional. Was once in a railway accident, since which she has been worse. Gets on very well with the children in the school-room, but in constant dread of joining the family in the drawing-room as she blushes most painfully in their society. The moment her hand is on the handle of the door, her heart commences to beat violently, she feels a constricted sensation in the throat, her face up to the roots of her hair becomes full of blood, her senses get confused, and if spoken to she cannot answer, partly from this cause, and partly from loss of voice.

CHAPTER V.

PHENOMENA ACCOMPANYING THE ACTUAL BLUSH.

The Redness of the Skin.—We may consider this under two heads:—*a.* The mode and rate at which the redness distributes itself; *b.* The area affected by the redness.

a. The mode and rate at which the redness distributes itself. According to Hagen[20] the blush occurs simultaneously

FIG. 1.—The blush began as a red spot at 1. This then became triangular as represented by the dots (2). A triangular patch next appeared at 3. The two patches then expanded irregularly, and finally merged into a continuous blush on the right cheek. Directly the first spot appeared she noticed a burning in this region. The blush always begins in this way and is usually limited to this side.

in all the parts affected. This no doubt may happen, especially in the slighter blushes; more frequently, however, the redness may be observed to begin and spread in a definite and sometimes very curious manner. Thus in one case (Fig. 1) it began as a burning round spot at 1. This gradually became triangular, as represented by the dots (2). Another tri-

[illegible] then appeared anteriorly to the ear (not at all [illegible]on situation). The two patches then gradually

FIG. 2.—Fig. 2 shows three stages of a spreading blush. When first observed its shape was as represented by 1; it then expanded, and occupied the area marked 2, and finally that marked 3.

enlarged, became irregular in shape, and finally merged into one. I have watched a similar development of the blush in several other cases, and I append drawings of two or three of

FIG. 3.—The blush begins in patches as indicated. These run together and form a continuous blush.

FIG. 4.—The opposite side of same face as Fig. 3.

them. In Fig. 2 the three different shadings represent the development of the blush at different stages. In the case represented by Figs. 3 and 4 the blush began on the left

side of the face in several discrete patches which gradually increased till they merged into one another; on the right side (Fig. 4) it began in the neighborhood of the ear as a somewhat triangularly shaped patch which gradually spread forward over the face.

Fig. 5 represents a blush which, as in the above cases, began in the form of irregular blotches; these by their union formed a continuous blush, a circular area in the centre alone remaining unaffected. This subsequently filled in.

The commencement of the blush in isolated patches must be due to the implication, at first, of very limited portions of

FIG. 5.—The blush began as several distinct blotches. These gradually merged into one another, forming a blush as represented in the figure, leaving a round patch in the centre unaffected. This subsequently filled in.

certain continuous vaso-motor centres; and its gradual spread is evidently due to the advance of the discharge along these centres. The rate at which the redness suffuses itself over the skin varies in different cases: sometimes it is so rapid as almost to appear instantaneous; sometimes it is slow, occupying, it may be, several minutes, and it need scarcely be said that there is a correspondingly slow or rapid advance of the discharge of the vaso-motor centres implicated. We may compare the advance of a nervous discharge along these to the explosion advancing along a train of gunpowder; why in some cases it should spread slowly and in others rapidly is a

question of some interest, but one which I shall not here attempt to answer.

b. The area affected by the redness. The parts most frequently affected in blushing are the cheeks, but in severe storms the forehead, ears, hairy scalp, neck, and upper part of the chest and back may be implicated, and sometimes perhaps even the hands. In pronounced blushing the ears seldom escape, the flushing of their vessels being made manifest to the sufferer by a tingling sensation in them. The great tendency of the ears to redden in blushing was remarked by Aristotle. He asks why the ears are chiefly affected in shame, while it is rather the eyes which are affected in anger.[21]

FIG. 6. -The redness in this case belonged rather to a flush than a blush. On the other side of face, the upper margin of the redness corresponded more or less accurately to the lower jaw.

In the milder forms of blushing, when the redness is generally limited to the cheek, its upper margin frequently corresponds to the lower rim of the orbit (Fig. 5). When the blush involves the neighborhood of the ears and the hairy scalp there is often a distinct interval or line of demarcation between its margin and these parts. This is also shown in Fig. 5.

Sometimes the blush is limited to certain isolated patches. Such patches, for instance, as I have already described may occur without merging into one another. And just as in flushes one side of the face only may be involved, so also may it be in blushing. I have seen two or three such cases.

Occasionally the blush affects the neck more than the face. In one case that I observed the redness suffused itself irregu-

larly over the upper part of the neck and the circumference of the face, and involved the left side of the face as indicated (Fig. 6).

It would be impossible to describe all the different ways in which the redness may be distributed, nor is there any occasion to do so: it is sufficient to point out how numerous and diverse these are. Before leaving the subject I would draw attention to the peculiar irregularity of outline which the blush may display (Figs. 5, 6, 7, 8).

Many of the phenomena which precede the actual blush may continue while it lasts. In the following account men-

FIG. 7.—Had irregular blush on left side as indicated; none on the right side. One week afterward the same blush was observed. There was no difference in the size of the retinal vessels.

FIG. 8.—Showing serpiginous margin of blush.

tion will only be made of those which according to my notes occurred while the skin was red.

Mental Confusion.—Intense blushing is almost always accompanied by mental confusion. This, as Darwin observes, is recognized in the popular expression, "She was covered with confusion." Most of my notes make mention of this mental confusion. In severe cases it almost amounts to a complete paralysis of the intellect, the individual being unable to pursue a consecutive train of thought. The following are illustrative cases:

Woman, æt. 33. During the blush her senses get confused,

and partly from this cause and partly from loss of voice she cannot answer if spoken to.

Man, æt. 25. During the blush he can scarcely trust himself to speak.

Man, æt. 32. Minister. During the blush he cannot recognize the sense of what he is reading in chapel, although he is able to formulate the words automatically.

Woman, æt. 23. During the blush she becomes confused and unable to collect her thoughts.

Persons in this condition of mind, Darwin says, often "stammer and make awkward movements or strange grimaces. In certain cases involuntary twitchings of some of the facial muscles may be observed."[22]

According to Tissot the lips quiver, and the individual stammers and stutters.[23] In fact, this author goes so far as to say that giddiness, tinnitus, and even sudden death from apoplexy, may occur.

Movements Prompted by Desire for Self-concealment.—The habitual blusher usually looks down or askance. The head or the whole body is turned away, and the eyes are afraid "to meet the gaze of those present;" occasionally effort is made to overcome this repugnance, with the result that they are restlessly moved from side to side. It is thus also that Darwin explains the tendency to blink during blushing.

Man, æt. 32. Commercial traveller; unmarried; says none of his family are nervous or gouty; suffers from constant blushing, great shyness, strong disinclination to meet or call on people. Very nervous when talking to customers, with dizziness and confusion of mind, twitching of eyelids, trembling of heart, and occasionally entire loss of memory.

It is astonishing how common is the objection to look others full in the face, especially among the educated classes, and more particularly among the overworked in these; the lower orders manifest it less frequently. I venture to affirm that if any one will take the trouble to make careful investigation—let him take, say, a hundred individuals of the well-to-do, cultured classes—he will find that a large number of them will try to avoid his direct gaze. Many are the expedients adopted toward this end. Some habitually address all

their conversation to a point on the wall, ceiling, or ground; some will only glance at you occasionally and furtively, as if fearing to be detected in the act; some, again, close or half-close their eyes while talking to you; while others look at you intently but sideways, with the head turned half away—in the manner known as glining. One tall, somewhat shy gentleman of my acquaintance is in the habit of throwing his head back and then directing his eyes downward toward the person to whom he is speaking. These are some of the devices adopted by that large class of individuals—probably all abnormally self-conscious—who dislike to look any one full in the face.

In severe cases of blushing the desire for concealment may sometimes be so great that the individual will bury his face in his hands, or rush quickly away.

Tremor.—As in flushing so in blushing, there may be a general tremor of the muscles. Thus—

Man, æt. 44. During blushing his hands shake, and other parts of the body tremble violently.

Man, æt. 38. Has latterly become so nervous that a step on the stairs leading to his office startles him, and if he is required to do any writing while any one waits he blushes, "his stomach seems to go into a ferment," his heart palpitates violently, and his hands tremble so much that he is almost unable to hold his pen.

Man, æt. 23½. Clerk. Has been exceedingly nervous since his fourteenth year. If he has to read or write before his employer he gets so nervous he cannot control himself; even the thought of having to do so brings on an attack. If he has to give a message of any length he may commence all right, but the nervousness is sure to come on after a few words, and he gets quite confused, almost incoherent. A sudden sensation comes on at pit of stomach, followed by trembling all over, palpitation, flushings of face, ears, and head, and inability to guide his hand to write even a line.

This tremor, like that occurring during a flush, is a species of paralysis. Some people who are excessively self-conscious experience such a partial paralysis of the muscles if they think they are observed. Under such circumstances it may

happen that they are unable to maintain their normal gait, their knees shaking and bending under them.

Hagen[24] points out that the condition of the muscles during blushing suggests a partial paralysis of them: the bowing forward of the body, the bending of the head, the drooping of the eyelids, the trembling of the lips and tongue, and the weakness of the limbs. And it may also be noted that fear, to which, as we have seen, shyness and shame are closely allied, exercises a similar paralyzing effect on the body.

Stimulation of the Lachrymal Glands.—During intense blushing the eyes not infrequently fill with tears. According to Burgess this occurs at the end of the attack. This is due of course to direct stimulation of the epithelial cells of the glands. It is an emotional manifestation, and may be compared to that which occurs during grief. Individuals differ very much in regard to the quantity of lachrymal secretion during blushing: in some it is not increased, in others the tears are more obtrusive than the blushing; indeed, there are some who, under circumstances which ordinarily induce blushing, simply become watery in the eyes. This I have observed several times. This condition is sometimes quite as trying as actual blushing.

Tingling.—Sometimes tingling is felt all over the body during the blush. This fact has been pointed out by both Burgess and Darwin. In the following case the tingling was followed by the development of a rash:

Woman, æt. 52. Subject to blushing, which is as bad in her own family circle as in society. Sometimes it is so intense as to cover her neck and chest and to extend to her hands with a tingling sensation over all, followed by a well-marked rash which remains for a short time.

This general sensation of tingling is interesting, showing us, as it does, that in blushing the cutaneous phenomena are not confined to the vaso-motor dilatation of the vessels of the face. It may be compared to the widespread sense of heat sometimes felt in an ordinary flush, and which, as observed, may be due to cortical changes pure and simple, independently, *i.e.*, of any actual changes in the skin. How far the sense of tingling in blushing is purely central, and how far it results from peripheral changes I cannot say, but the fact that it

was in the above case followed by a rash suggests that it may be connected with some actual nervous changes occurring in the skin.

Palpitation has already been mentioned as sometimes heralding the blush. It very frequently occurs with it. A number of my cases illustrate this fact. Breathlessness and constriction in the throat are less common symptoms of the blush, but like most, if not all of them, may be sometimes noticed before the actual blush is observed.

Perspiration occurred in some few cases. Thus—

Man, æt. 24. When the blushing is intense his heart "beats with terrific force," and his face becomes wet with perspiration.

Man, æt. 35. Fancies every one is looking at him in church, blushes, gets confused and breaks out into a profuse perspiration.

CHAPTER VI.

PHENOMENA SUCCEEDING THE STAGE OF REDNESS.

BURGESS points out that the blush may be succeeded by pallor of the face.[25] Similarly, Hagen, who had not apparently read Burgess' essay, writes: "When the blush begins to vanish, the natural color of the face returns or it becomes pallid."[26] I have already quoted the lines of Racine, in which he says: "Je rougis je pâlis," recognizing the fact that pallor frequently succeeds the redness. This fact, which I have repeatedly noticed, is interesting. It will be remembered that ordinary flushes are frequently followed by a cold stage, during which there is constriction of the cutaneous blood-vessels, the face being often distinctly pale. There can therefore be little doubt that the pallor which succeeds the ordinary blush is analogous to the cold stage of the flush.

While the blush is disappearing, or during the succeeding pallor, the face may be again suddenly suffused; and this may happen several times. If the blush is intense it may be followed by prostration, which may continue for a long time. As a rule, however, the symptoms rapidly pass away with the disappearance of the blush.

* * * * * *

Artificial Blushing may be briefly alluded to here. In 1874, Ludwig Meyer described a peculiar reddening of the skin which he designated artificial blushing.[27] The following is an epitome of his two cases:

Woman, æt. 33. Insane. While Meyer was listening to the patient's heart, she turned her head to the right, and thus brought the right cheek in contact with the corner of the pillow. This slight touch caused a burning redness on the upper part of the neck and the lower part of the cheek, near the angle of the jaw—in the parts, namely, which had been impressed by the pillow. Meyer then found that gentle strok-

ing with the finger, or with the bedclothes, caused a similar redness to appear on the cheeks, throat, and neck. After a short time the spots of redness disappeared from their circumference toward the centre. Similar spots would suddenly appear on the cheek without any evident contact, and as suddenly disappear. How far the skin of the rest of the body displayed a similar tendency Meyer was not able to discover, owing to the unfavorable condition of the patient.

Woman, æt. 33. Insane. In this case also the skin of the face and neck responded in a similar way to contact. Although the extent of the redness was greater than the surface touched, yet they so corresponded in form that it was possible to draw figures and write letters on the skin. The covered parts of the body failed to respond in the way indicated.

Meyer points out that the reddening in these cases differed from Trousseau's tâche cérébrale in that it was capable of being called forth by the slightest contact, in its very rapid, almost instantaneous development, in its highly evanescent character—not lasting for more than two seconds, and finally in its limitation to the face, neck, and throat. He accounts for this limitation by the fact that the vessels of these exposed parts are very susceptible to dilatation, and he agrees with Darwin's explanation of this circumstance.

A very similar case was subsequently recorded by Kelp,[28] but in his patient the phenomena could be produced on the arms and chest.

CHAPTER VII.

PHYSIOLOGY.

FLUSHING and morbid blushing must not be regarded as by themselves constituting diseases, but rather as manifestations of some general defect—temporary or permanent—in the nerve centres: wherefore our treatment should be directed to the remedy not simply of the flush or blush, but of the general nervous defect of which they are the expression. A person who suffers from flushes does not suffer from them alone, but is the victim of a long train of other nervous phenomena—his whole nervous system is out of gear. And similarly, it cannot be said of the inordinate blusher that the mere tendency to blush on the slightest occasion is the sum total, the beginning and the end, of his disorder. There is in his nervous system a radical fault, and one indeed of a much more serious kind than in the case of the flusher. It frequently rests upon an inborn weakness which expresses itself in many other ways than by blushing.

It may seem self-evident that we should, in flushing and blushing, treat the general condition and not the symptoms merely, but is this principle always acted upon? Is it, for instance, in epilepsy, neuralgia, asthma and all the so-called functional nervous disorders? Are they not rather looked upon generally as separate and independent diseases? Yet they, as much as flushing and blushing, are in reality differing manifestations—determined by individual peculiarities—of a radical defect in nervous organization, a defect not limited by any means to the centres primarily engaged in the particular nervous storm by which it makes itself felt, but ramifying through the entire nervous system. No one can suppose that the actual epileptic fit constitutes the whole of the abnormalities of nervous function to which the epileptic is liable.

Instead, therefore, of confining my remarks to the mere treatment of symptoms, I shall take this opportunity of set-

ting forth what I conceive to be the general principles which should guide us in our treatment of nervousness in all its forms; my remarks will, in fact, deal with what I may call "the philosophy of the treatment of nervousness." At the end, however, I shall append a brief account of practical treatment.

The nervous system is made up of ganglion-cells, of nerve fibres (which are merely the prolongations of the cell processes, enveloped in one or in two sheaths), and of nerve-endings.

The ganglion-cells are connected by their processes into

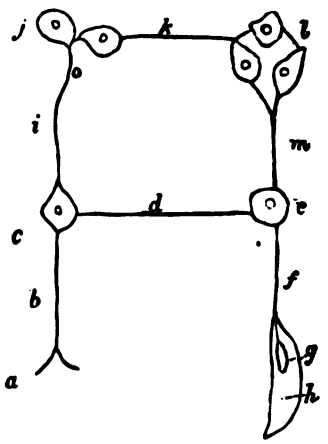

FIG. 9.—*a*, Nerve-ending; *b*, afferent nerve; *c*, lowest sensory centre; *d*, nerve fibre connecting *c* with *e*; *e*, lowest motor centre; *f*, efferent nerve; *g*, motor nerve-ending; *h*, muscle (or epithelial) cell; *i*, afferent fibre connecting *c* with *j*; *j*, Ferrier's cortical sensory centre; *k*, fibre connecting *j* with *l*; *l*, Ferrier's cortical motor centre; *m*, fibre connecting *l* with *e*.

centres, and these again, either directly, by means of the cell processes themselves, or indirectly, through the intermediation of the nerve fibres, with other centres. The accompanying diagram represents a miniature nervous system as thus constituted. (The above diagram takes no account of Hughlings Jackson's "highest" centres. I am not aware that any centres corresponding to *c* have been discovered, but, with Jackson, I assume the existence of such.)

An impulse passing from *a* may contract the muscle, or explode the zymogen, of the epithelial cell through the lower reflex arc *b, c, d, e, f*, or through the upper reflex arc *b, c, i, j, k, l, m, e, f*, in the latter case consciousness intervening. I

have supposed the efferent part of the arc to belong to the muscular nervous system only, but there are of course other efferent strands, chief among which are those passing to gland-cells and controlling their action.

Each ganglion-cell is a more or less independent organism, which, like the amœba, lies bathed in a fluid from which it derives its food (including oxygen) and to which it returns its refuse.

Wherefore it follows that the ganglion-cell may be influenced from without in one of two ways: (1) By the plasma bathing it; (2) By nervous impulses striking it through its processes. In other words, the environment of the cell is made up of plasmic and of nervous influences. In the three following chapters I shall consider these influences, but it will be first necessary to say a few words about the structure of ganglion-cells and their grouping into centres. Of the structure of the nerve fibres and nerve-endings I need say nothing, because the part, if any, which their structural peculiarities play in the causation of functional nervous diseases is certainly subsidiary: the ganglion-cells are the evolvers (it is possible that the nerve fibres are themselves capable of evolving nerve force, but in an infinitely less degree than the ganglion-cells) and co-ordinators of nervous impulses, and it is essentially to these that we must look in our attempt to decide what share structural peculiarity of the nervous system takes in the production of its various functional disorders.

Structure of Ganglion-cells.—We may consider this under two heads—*a*, discoverable structure; *b*, undiscoverable structure. The former includes all that which may be made out by means of the microscope: the general outline of the cell, the number of its processes, the structure of the nucleus and nucleolus, and the appearance of the protoplasm. The latter includes the arrangement of the atoms into molecules (the molecules containing hundreds, perhaps even thousands, of atoms) and of the molecules among themselves. It may be objected here that I am trying to make a distinction where none actually exists. It is, of course, on the constitution and the disposition of the molecules that the discoverable structure of the ganglion-cell depends, but microscopic examination tells us very little or nothing about the combination of molecule with molecule, and less still of atom with atom. The word

Structure, as generally used, refers to the arrangement of matter as we can discern it by the senses, whether artificially aided or not. To suppose, however, that in the world of the infinitesimal structure stops at that point at which we cease to detect it, is absolutely unwarrantable. Taking that portion of space occupied by a single human body as a standard of measurement, have we any reason to suppose that this standard is any nearer the infinitely small than the infinitely great? If we apply a mathematical test, we must, I think, answer in the negative; for though we double our standard measure *ad infinitum* we are no nearer exhausting infinitude in the one direction than by halving it *ad infinitum* we are nearer in the other; for no matter how often we multiply our quantity we still have illimitable space beyond, and no matter how often we divide it, we still have left the half of what was last divided. (This statement may be mathematically illustrated thus:—Infinitely is $\frac{1}{0}$. Now it makes no difference if we take $\frac{1}{0.2}$ or $\frac{1}{0.3}$ or $\frac{1}{0.4}$ or $\frac{1}{0 \times \text{infinity}}$, we still arrive at the same result, *i.e.*, $\frac{1}{0}$ for manifestly 0 multiplied by any number, however small or great, remains 0. Again, if we take $\frac{1}{0.\frac{1}{2}}$ or $\frac{1}{0.\frac{1}{3}}$ or $\frac{1}{0.\frac{1}{4}}$ or $\frac{1}{0 \cdot \frac{1}{0}}$ each, as before $= \frac{1}{0}$, *i.e.*, infinity.)

Seeing, then, how far we may penetrate into the world of the infinitesimal without reaching its limit, have we not room within our ganglion-cell for structural arrangements as complex as any we can detect by the senses, whether aided or not —have we not, indeed, good reason to ask whether undiscoverable structure may not be far more complex than discoverable—as complex, perhaps, as the whole disoverable structure of the body? If we approach the subject of ganglionic structure with such thoughts as these, we shall be in a position to understand how a cell may cease to carry on its functions aright, even though no alteration in its structure be apparent.

Grouping of Ganglion-cells.—The ganglion-cells constituting the nervous system are exceedingly numerous, and in order that they shall act in harmony, it is essential that there shall be proper connection between them, that they shall be properly grouped into centres, and these centres properly connected one with another. For one centre may profoundly influence another, increasing or diminishing its activity; wherefore any imperfection in the ganglionic groupings will

tend to disordered action. Nervous health is nothing less than the harmonious working together of all the cells forming the nervous system, in other words, a proper co-ordination of ganglionic action, and to this end the ganglionic cells must manifestly be properly grouped.

When an individual inherits a tendency to epilepsy, asthma, or other classical neurosis, it is very probable that the connection between the several centres is somewhere defective, and such structural defect would alone be sufficient to account for these disorders; but it is possible that in these cases of hereditary weakness the ganglion-cells are themselves imperfect, and of course the very fact of imperfect connection between them points to one defect at least. It should be noted that in either case there would be no definite lesion. (Although epilepsy has not hitherto been considered due to any discoverable lesion, it has recently been stated by Bevan Lewis [*op. cit.*, 522–525] that distinct ganglionic degeneration is present in this disorder. According to him, the small ganglion-cells in the second layer of the cerebral cortex degenerate and eventually disappear, the change beginning with fatty degeneration of the nucleus, and the fat, later, being extruded, and a vacuole left—a process which he terms vacuolation of the cells. He further asserts that these small cells of the second layer are sensory, and in a normal condition exert an inhibitory influence on the large and more deeply seated motor-cells, a point which he considers proved by the incoherent discharge of the latter, when the former have degenerated. With this conviction on the part of such a reliable authority before us, we can scarcely any longer doubt the existence of a discoverable lesion in advanced stages of the disease, but it is still open to question whether it is present in the earlier stages. Presumably all Bevan Lewis's observations were made upon cases of very advanced epilepsy.

In regard to the plasmic environment of the ganglion-cell, I have said that each cell lies, like an amœba, bathed in a fluid, and I am borne out in this statement by Bevan Lewis. He remarks that each of the large ganglion-cells "is inclosed within a circular, oval, or pyriform space," called the pericellular sac, and he further shows that each is supplied with a special arteriole or capillary, whence arises a delicate loop which encircles the sac. *Opus cit.*, pp. 81–83.)

CHAPTER VIII.

INFLUENCE OF PLASMA.

Influence of Plasma on Structure.—We now proceed to consider the influence of environment on the structure and functions of the ganglion-cell. And first as to the plasmic environment and its influence on structure. The proper evolution of the cell, *i.e.*, its proper growth both as to its discoverable and undiscoverable structure, and its proper union, by means of its processes, with other ganglion-cells, depend upon the nature of the plasma in which it is bathed. If, during the evolution of the nervous system, this plasma be for a long time imperfectly constituted, it is evident that the normal development of the ganglion-cells will be interfered with. This is what happens in rickets. During early life, when the evolution of all the tissues, and particularly of the nervous, is rapid, their component cells are bathed in imperfect plasma; hence their imperfect evolution, and on no tissue is the effect so disastrous as on the nervous. Compare the functions of a ganglion-cell with those of a gland-, muscle-, or any other cell, and you realize at once how much more serious is the imperfect development of the one than of the others. We have abundant evidence that the nervous system is very seriously involved in rickets; all rickety children are highly nervous; laryngismus stridulus and tetany are practically confined to them, and they are moreover particularly liable to infantile convulsions. That this injurious impress on the nervous system is permanent is shown by the fact that these convulsions may develop, at a later period of life, into epilepsy. This statement I give on the authority of Gowers, who further shows that epilepsy may be traced back to rickets even when there have been no infantile convulsions. From these facts we may safely assume that an individual who has had rickets, even though he has not during childhood suffered from any obtrusive nervous symptom, is yet differently constituted—and that unfa-

vorably—as to his nervous system from what he would have been had he not had rickets; and further, that this imperfect evolution of his nervous system is due to unhealthy blood-plasma.

The environing plasma may err both by defect and by excess: it may err, namely, by not containing in proper quantities the several substances essential to life, or by containing substances injurious to life: in either case the evolution of the ganglion-cell is interfered with. Prolonged starvation (= defect) necessarily prevents proper growth, and the influence of various poisons (= excess) engendered within the animal organism may be yet more fatal. So injurious indeed may be their action on the ganglionic cells that it will be well here to consider it at some length.

In the old days most diseases were attributed to poisons—or "humors," as they were then termed—generated in and flying about the body, but with increased knowledge of physiology these crude ideas were necessarily much modified, with the result that medical thought ran into the other extreme, and their influence in setting up disease was for a time almost entirely lost sight of. Gradually, however, it began to be surmised that many of the symptoms of disease were caused by such poisons—that uræmia, *e.g.*, might be due to the retention of nitrogenous sewage, and that the long train of symptoms peculiar to the typhoid state might be caused by the saturation of the tissues with poisonous matters; and recently the brilliant researches of Gautier have placed it beyond a doubt that poisons are being continually generated in the body, though they produce no evil effect during health, owing partly to their constant excretion with the urine, fæces, and sweat, and partly to their destruction (chiefly, perhaps, by means of the liver) within the body as they form. These poisons are strictly analogous to the vegetable alkaloids (*e.g.*, nicotine, morphine, atropine), and they have therefore been named "animal alkaloids." They are of two kinds: *a*, the ptomaines, those produced during the disintegration (by means of ferments) of the albuminoid elements of dead tissues, a process which is continually occurring, during digestion, in the stomach and intestines; *b*, the leucomaines, those formed during the activities of living tissues.[29] Though innocuous in a normal state of the body, they are apt, under certain cir-

cumstances, to accumulate unduly and with disastrous effect; they may be, *a*, produced in excess, as in dyspepsia; *b*, imperfectly destroyed by the liver (or other organ); *c*, imperfectly eliminated as in constipation. The symptoms thus resulting will be best considered when we come to treat of the influence of plasma on function.

Meanwhile it is sufficient to point out that the plasma poisoned for years by these substances interferes with the due development of the ganglion-cells. I am, in fact, inclined to think that the imperfect evolution of the nervous system in the "rickety" patient is to be attributed more to the influence of such poisons on the nerve-ganglia than to mere starvation of them in consequence of an impoverished plasma.

Just as the evolution of a ganglion-cell (and therefore of the nerve centre of which it forms a part) may be interfered with by an improperly constituted plasma, so also may the structure of a perfectly evolved cell or centre be injuriously affected, dissolution, partial or complete, resulting. Let us take the case of a woman—and London affords examples of thousands such—who has sunk into an extremely nervous state through prolonged suckling, anxiety, overwork, under-feeding, and the breathing-in of foul air. The plasma is faulty both by excess and by defect—by excess in that it contains a number of poisonous, adventitious substances; by defect in that it does not contain the due amount of proper food-stuffs and of oxygen. In some instances, there is no general loss of weight, owing to the production of fat so common in anæmia, but in the worst cases we generally find the woman both emaciated and anæmic, and if we could weigh the different tissues of the body we should find those constituting the nervous system to have suffered less in this respect than any other soft tissue. (The fact that in starvation the nervous system loses less in weight than any other tissue is, I suppose, connected with the fact that the tissues which constitute it are by far the most important. Every active cell in the body receives a nerve-twig, and therefore the body is practically made up of a nervous system, the efferent nerves of which have at their peripheries so many non-nervous cells. Viewed thus, the pre-eminent importance of the nervous system is apparent, and we see how necessary it is that, during the prolonged periods of starvation to which most animals in their

natural state are from time to time subjected, its integrity should be preserved. I presume that its power to appropriate to itself the largest share of available food, or perhaps even to feed upon the rest of the body, has been acquired through natural selection.) But such loss of weight as they do suffer has certainly a highly injurious effect, so that what with starvation and what with a vitiated plasma-supply during a long period, the higher centres undergo dissolution—there is an undoing of evolution. This is proved by a study of the highest nervous functions. There is failure in self-control, an exaggeration of the more ignoble emotions (*e.g.*, anger, fear), and many other functional changes pointing in the same direction. This dissolution involves, in the first place, what I have called the undiscoverable structure, but after a time the discoverable structure becomes affected, the cells perhaps altering in general outline or in the connection of their processes. Now it seems to be a fact that when a living organism has undergone change from its normal state, it tends, when placed amid its normal environment, to revert to the normal condition. Thus when the anæmic patient is well fed up, helped by tonics (especially iron), placed amid sanitary surroundings, and relieved from all distress of mind, the blood in most cases rapidly recovers itself; and the plasma environing the ganglion-cells being once again rich in foodstuffs and oxygen, and free, moreover, from poisonous matter, will in most cases permit those cells to revert to their normal state. Whether recovery is complete or partial will depend upon the extent to which dissolution has taken place; this may have proceeded so far that the cell can never completely recover itself, and in such cases the nervous system remains permanently injured.

Ganglion-cells are, it is well known, highly impressionable, and impressions, however slight, tend when once wrought upon them, to be perpetuated. This truth is exemplified by the ganglion-cells which subserve intellectual memory. When once these are agitated in a particular way they retain the power of recalling that particular agitation; there is left behind what has been termed "a residual state," which state consists in some change in the undiscoverable structure of the ganglion-cells. The forces that may cause the change are exceedingly subtle: a glance, a word, may be remembered for a

lifetime; that is to say, the vibrations of the ether, the undulations of the atmosphere, are sufficient to bring about permanent ganglionic change. The higher nerve centres possess, more than any other tissues, this susceptibility of permanent impression by delicate forces, and this fact suggests that an injurious impression made upon the cortical gray matter itself must have a more abiding tendency than one made upon any other tissue. How far this is true of influences that strike through the plasma I know not, but it certainly holds good of injurious influences operating through the cell processes, as I might show by citing some of the many evil habits of the nervous system.[30]

When once an individual has suffered from a functional nervous disorder he is much more liable than before to a subsequent attack: the centres implicated retain a memory of the disorder, that is to say, they retain the power of resuming the abnormal state peculiar to it.

Influence of Plasma on Function.—Having seen how abnormal plasma may lead to improper evolution and to dissolution of the ganglion-cell—the structure in either case being distinctly altered—let us now briefly consider the influence of the plasmic environment on ganglionic function as distinct from structure.

a. Abnormally constituted plasma. Peculiarities of blood-plasma are, it is well known, capable of causing serious perturbation of nervous function. The various chemical poisons, notably the ptomaines and leucomaines, afford good examples. These substances, as already mentioned, closely resemble many vegetable alkaloids, for example, atropine and morphine, in their influence on the nervous system. Who that has watched the delirium and coma of typhoid fever can fail to recognize their likeness to the symptoms produced by alkaloid poisoning?

That disordered digestion may exercise a peculiar influence upon the nervous system has been known from time immemorial. This is, in some instances, without doubt due in part to direct influence exerted by the digestive viscera upon the cortex, but there can be still less doubt that it is due chiefly to ptomainic poisoning.[31] The profound sleepiness which many dyspeptics complain of almost certainly arises from this cause. I have now under observation a patient who about half an hour after his meals begins to suffer from very dis-

CHAPTER VII.

PHYSIOLOGY.

FLUSHING and morbid blushing must not be regarded as by themselves constituting diseases, but rather as manifestations of some general defect—temporary or permanent—in the nerve centres: wherefore our treatment should be directed to the remedy not simply of the flush or blush, but of the general nervous defect of which they are the expression. A person who suffers from flushes does not suffer from them alone, but is the victim of a long train of other nervous phenomena—his whole nervous system is out of gear. And similarly, it cannot be said of the inordinate blusher that the mere tendency to blush on the slightest occasion is the sum total, the beginning and the end, of his disorder. There is in his nervous system a radical fault, and one indeed of a much more serious kind than in the case of the flusher. It frequently rests upon an inborn weakness which expresses itself in many other ways than by blushing.

It may seem self-evident that we should, in flushing and blushing, treat the general condition and not the symptoms merely, but is this principle always acted upon? Is it, for instance, in epilepsy, neuralgia, asthma and all the so-called functional nervous disorders? Are they not rather looked upon generally as separate and independent diseases? Yet they, as much as flushing and blushing, are in reality differing manifestations—determined by individual peculiarities—of a radical defect in nervous organization, a defect not limited by any means to the centres primarily engaged in the particular nervous storm by which it makes itself felt, but ramifying through the entire nervous system. No one can suppose that the actual epileptic fit constitutes the whole of the abnormalities of nervous function to which the epileptic is liable.

Instead, therefore, of confining my remarks to the mere treatment of symptoms, I shall take this opportunity of set-

ting forth what I conceive to be the general principles which should guide us in our treatment of nervousness in all its forms; my remarks will, in fact, deal with what I may call "the philosophy of the treatment of nervousness." At the end, however, I shall append a brief account of practical treatment.

The nervous system is made up of ganglion-cells, of nerve fibres (which are merely the prolongations of the cell processes, enveloped in one or in two sheaths), and of nerve-endings.

The ganglion-cells are connected by their processes into

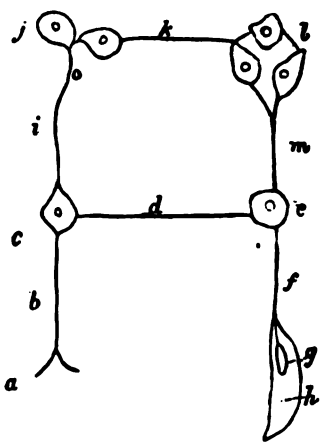

FIG. 9.—*a*, Nerve-ending; *b*, afferent nerve; *c*, lowest sensory centre; *d*, nerve fibre connecting *c* with *e*; *e*, lowest motor centre; *f*, efferent nerve; *g*, motor nerve-ending; *h*, muscle (or epithelial) cell; *i*, afferent fibre connecting *c* with *j*; *j*, Ferrier's cortical sensory centre; *k*, fibre connecting *j* with *l*; *l*, Ferrier's cortical motor centre; *m*, fibre connecting *l* with *e*.

centres, and these again, either directly, by means of the cell processes themselves, or indirectly, through the intermediation of the nerve fibres, with other centres. The accompanying diagram represents a miniature nervous system as thus constituted. (The above diagram takes no account of Hughlings Jackson's "highest" centres. I am not aware that any centres corresponding to *c* have been discovered, but, with Jackson, I assume the existence of such.)

An impulse passing from *a* may contract the muscle, or explode the zymogen, of the epithelial cell through the lower reflex arc *b*, *c*, *d*, *e*, *f*, or through the upper reflex arc *b*, *c*, *i*, *j*, *k*, *l*, *m*, *e*, *f*, in the latter case consciousness intervening. I

I think there can be little doubt that the vaso-motor disturbances met with in megrim are secondary also. In some cases there is arterial dilatation of the painful part; in others, constriction; in others, again, the action is irregular, the vessels being contracted in one part, dilated in another. Moreover, the condition of the vessels may vary with the attacks, the arteries being sometimes contracted, sometimes dilated. A like inconstancy of vaso-motor action presented itself in a patient of mine, the victim of severe anginoid attacks. These were at first accompanied by marked pallor, and afterward by excessive redness of the face. (I saw her in one of the latter attacks.) Later on she suffered from each kind of attack on the same day, that in the morning attended by pallor, that in the evening by flushing.

But though such highly specialized disorders as epilepsy and megrim are probably not primarily due to vaso-motor irregularities, there is no doubt that irregular action of this system is capable of producing very unpleasant symptoms. In order that the nervous system shall carry on its functions aright, the blood supply to its several parts must be regulated with great nicety; at one time a certain part requires much blood, at another, a small quantity only, and we can understand how ill-regulation of the supply might lead to functional nervous disturbance. Nerve tissue, like every other, requires rest in order to recoup itself, and that there shall be rest, the blood supply to a part must be diminished; if, therefore, owing to erratic vaso-motor action, a part be for days together superabundantly supplied with blood, it will not be allowed to rest, and exhaustion will result. (See on this subject A. Gamgee, F. R. S., "Practitioner," February, 1877. It should be remembered that so far as glands, at all events, are concerned, an excessive supply of blood to them does not necessarily cause increased activity, as is proved by the well-known experiments on the submaxillary gland in which the chorda tympani is divided. Something more than an increase of blood supply to a cell seems necessary in order to excite its proper functional activity; hence it may well be doubted whether a mere increase in the supply, continued for an unwonted period, is sufficient to cause its exhaustion. We may be quite sure, however, that long-continued hyperæmia will lead to functional disturbance of the cell.

It is, I think, almost certain that some of the symptoms of nervousness are due to alteration in the pressure of the plasma environing the ganglia (this pressure being of course regulated by the vaso-motor system and heart) for the nervous are very liable to erratic vaso-motor action. We have already noticed that little is known about the symptoms referable to active congestion of the brain and spinal cord, because we seldom have any means of knowing the vaso-motor condition of these parts. Whether the condition known as plethora necessarily leads to increased pressure in the blood capillaries (and therefore in the extra-vascular plasma) I do not know: theoretically there is no reason why it should, seeing that a considerable quantity of fluid may be injected into the vessels of an animal without altering the arterial pressure or presumably, the capillary pressure either—owing to a compensatory arterial dilatation. It is certain, however, that plethora is frequently accompanied by distinct nervous symptoms which disappear after bleeding, foremost among these being giddiness, noises in the ears, and confusion of thought, all of which are very common in cases of sudden cessation of menstruation. They may also occur in plethoric men: I can recall two such instances. The first, already alluded to, is that of a florid, full-blooded man, who for many years has suffered a monthly loss of blood per rectum; just before the wonted period he experiences giddiness, confusion of thought and other nervous symptoms, all of which are removed by a copious flow. The other is that of a man of like habit who for some time had been experiencing very similar symptoms. One night, after a highly indigestible supper, he was attacked with great pain in the stomach and violent vomiting which led to a profuse hæmatemesis, after which his unpleasant symptoms almost entirely disappeared. I cite these cases because they seem to prove that an excessive quantity of blood may cause unpleasant symptoms, and also because I have heard good authorities maintain that a loss of blood is always to be deprecated.

We have now seen that the condition of the plasma exerts a marked influence upon the ganglion-cell, favoring or retarding its evolution, or, it may be, causing temporary functional irregularities, or actual dissolution.

Considering what a potent effect the plasma exerts on

ganglionic evolution, it behooves us to be especially careful about its condition in all cases of nervousness occurring before maturity is attained, particularly when it is further remembered that the influence of a mal-environment for evil is great in proportion as it acts early in life. (See "Causation of Disease," page 135.) After a tissue has completely evolved, the cell environment, though still capable of working good or evil upon nervous structure, is much less effective than before complete evolution. (I do not of course allude to such serious forms of injurious environment as cause total and immediate dissolution.) Now the evolution of the nervous system extends much farther on into life than that of any other organ or tissue of the body: it does not cease when maturity is reached, the nerve centres retaining almost to the very end a high degree of plasticity, or power of being moulded for good or evil. Wherefore, even though the environment of pre-adult life may have been very imperfect, and proper evolution of the entire organism, including that of the nervous system, in consequence interfered with, we need not give up all hope of improving nerve-structure, but should exert the utmost effort to surround every ganglion-cell with a plasma rich in the essentials of life and free from substances injurious to it.

The best means of effecting this we will deal with in a separate chapter.

CHAPTER IX.

INFLUENCE OF NERVOUS IMPULSES.

In the last chapter we dealt with the influence of the plasma on the ganglion-cells. In this and the following we shall consider how those structures may be still more deeply influenced by nervous impulses striking upon them through their processes. It is in this way the force stored up in the ganglion-cells—the nerve-dynamite as we may call it—is exploded or "discharged," *i.e.*, driven in the form of molecular vibrations along nervous channels to other ganglion-cells, or to muscle- or gland-cells, modifying their activty. The striking of a nerve ganglion-cell by a series of molecular vibrations (= nervous impulses) through one of its processes usually causes such a discharge, though it should be noted that it may have the very opposite effect, viz., may diminish the functional activity of the cell or inhibit it altogether, paralysis resulting. Every ganglion-cell is moreover supposed by some authorities to contain within itself the power of curbing its own activity—the power of self-control—and this control, whether inherent in the cell or exerted by another cell or other cells, is one of the highest functions of the nervous system. When it is wanting, the cortical ganglion-cells discharge themselves wildly, as in epilepsy, and there is then heightened functional activity but of a degraded type: the cells discharge their energy inco-ordinately and inconsequently, much as young undisciplined troops, in the excitement of battle, rapidly exhaust their ammunition without effect for want of calculation of distance and steadiness of aim.

The directions which the molecular vibrations take as they escape along the efferent strands of a discharging ganglion-cell depend upon the connections peculiar to the cell. These connections are in their discoverable structure mainly determined by heredity, but the peculiarities of their undiscoverable structure are in a considerable degree acquired, for the

ganglion-cell is highly plastic as regards the latter. There is probably nothing else in nature so plastic. A substance like clay or putty is readily moulded, but the moulding that such materials admit of is merely an external moulding, a moulding of visible form. A metallic substance also, in response to vibratory forces striking it from without may be moulded, and still more intricately, an actual re-arrangement taking place in its internal structure; but in either of these instances the process is comparatively simple. It is far otherwise with the ganglion-cell; the moulding in its case is infinitely complex, and is effected in ways so delicate and subtle that while each new impress is retained, the previous impressions tend to remain unaffected.

Thus, when series after series of vibrations strike upon the ganglion-cell through its processes, its undiscoverable structure may be gradually altered. Each vibration influences this in such a manner that it will more readily undergo the change a second time, and by the constant repetition of the same process the cell becomes at length more or less permanently modified, its molecular structure more and more complex, till, finally, the discoverable structure is modified also, the cell perhaps becoming larger and the ramifications of its processes more numerous than before. Who will doubt that the motor-ganglion-cells of Liszt were individually and collectively more structurally complex than those of a navvy having the same potentiality?

Education has essentially for its purpose the moulding of ganglion-cells. The process is both conscious and unconscious, but in either case the moulding forces are applied from without—through the eye, the ear, the sense of touch: by such delicate forces as ether vibrations and sound vibrations are the ganglion-cells elaborated for good or for ill.

The training of the nervous system is a subject of great importance to the physician. If he can modify not only the invisible, but also the visible, structure of the ganglion-cell, it is manifest that he has at his command a valuable means of preventing disease.

No drug can strengthen or weaken the various connections between the ganglion-cells, but education can do this, and now that education is fast becoming—if it may not already claim to have become—a science, there is much hope that it

may effectively help us in the cure of hereditary nervous weakness. Take, for instance, the immoderate blusher. Excessive tendency to blush, or what is practically much the same thing, excessive shyness, generally manifests itself at an early age. Great shyness probably always goes along with the nervous diathesis; we observe it in those who show a liability to neuralgia, epilepsy, and even insanity. Whenever, therefore, it is very marked in a child, all the resources of education should be directed to combat it, to nip it in the bud, lest it develop into actual disease.

One of the great advances in modern education is that it recognizes that all are not cast in the same mould, and therefore cannot rationally be subjected to exactly the same kind of training; that what is suited to one is utterly unfitted to another, and that it is more than folly to submit all to one rigid, fixed mode of treatment—a true bed of Procrustes to the infinite varieties of human need and capacity. Thus the over-sensitive child, with a marked tendency to shyness, requires a peculiar care and watchfuless that would be wasted on, if not positively hurtful to, one of more robust nervous organization. To treat of this subject in detail would require more space than I can here give it. I will merely point out that by skilful treatment much may be done to strengthen a congenitally weak nervous system. Especially should the habit of introspection and the desire for solitude be discouraged. Children of all kinds benefit much by freely consorting with other children, but more particularly is this the case with those of nervous temperament, and for this reason school-life—provided always that the school is properly conducted—is generally the best life for them. The open criticism that obtains among a number of young persons, the badinage so freely levelled at any idiosyncrasy, the raillery that meets all attempts at "moping," above all, the common interests, the common life which allows no single individual to be the special subject of attention, and thus counteracts the tendency to self-absorption, constitute a very wholesome influence and lead to a happy modification of many peculiarities of temperament, nervous or other, which the fostering care of home would be too gentle or too indulgent to correct. All such good results, however, presuppose careful and intelligent supervision on the part of those in authority, and the individuality of the child

must never be lost sight of or disregarded. By the time a child is old enough to be sent to school its parents should have acquired at least a fairly accurate knowledge of its character, which knowledge should be made available for its future teachers, and these, if fitted for their calling, will know how to apply it in their own dealings with the child. Given these precautions, and I believe that nothing will be found so effectual as school-life to arrest any tendency to functional nervous disease in children.

The moral treatment of the adult blusher is much more difficult, seeing that in him the character is not forming, but formed. Here also every effort should be made to check the tendency to introspection and solitude. Doubtless much may be done for him by regulating his habits of thought and of life; but, unfortunately, he too often belongs to a hopelessly weak nervous type, inveterate blushers mostly coming from families showing a well-marked history of insanity and epilepsy. As a rule subjects of this kind show a decided nervous tendency from an early age; sometimes, however, an individual who has hitherto enjoyed very good nervous health, and who has manifested no particular tendency to blush will, all of a sudden, under some serious perturbation of his nervous system, become exceedingly shy and reserved—much as an individual may be suddenly attacked with epilepsy or insanity. Many of these cases may be benefited or cured with proper care, and it is very necessary to take them in hand before they drift into hopeless chronicity and incurability.[33]

CHAPTER X.

NERVOUS DISORDERS CAUSED REFLEXLY.

A GANGLION-CELL may discharge itself spontaneously. By this is meant that it may communicate vibrations down one or more of its processes independently of forces striking it through those processes, and also independently of any specially plasmic influence. It is possible, for instance, that the various ganglia that send down rhythmical impulses to the inspiratory muscles during ordinary breathing discharge themselves thus spontaneously, and if this is the case we must suppose that they are by nature so constituted that, when bathed in healthy plasma, there is inherent in them the power to set up a series of rhythmical changes. This unaided action of a centre is spoken of as automatism. Of course we cannot exclude the plasma from some share in the process, because the vital changes of protoplasm are really the outcome of the interchange of the protoplasm and its plasma; but in the case of true automatism there is nothing peculiar in the plasma to excite the nervous discharge, which is therefore essentially due to the constitution of the cell.

Possibly many of the ganglia which regulate the functions of organic life possess this automatic power. It is doubtful, however, whether it resides in the higher ganglia in any considerable degree, if at all. The cortical ganglionic discharges, for instance, which occur during voluntary movements, take place in response to influences striking the ganglion-cells through their processes; the cortical ganglia may also be "discharged" by specific plasmic influences—by poisons circulating in the blood, the discharges thus excited taking, however, little or no part in the physical changes which underlie normal mentation. The automatic centres, though capable of spontaneous action, may be similarly affected either through their processes or by specific plasmic influences; for instance, the ganglia of the heart are capable of being influenced through

the sympathetic or vagus, or by the direct action of poisoned plasma upon them.

Automatic ganglionic discharge is therefore limited in its range, and when or how a ganglion-cell shall discharge itself depends chiefly upon external influences in the shape of a peculiarly constituted plasma and of nervous impulses, the latter being the more important of the two. We must think of the various ganglion-cells of the body as forming together, by means of their processes, a complicated network; a continual stream of vibratory impulses strikes upon the cells through the intercommunicating network, and during its entire life-history a ganglion-cell is never once left wholly undisturbed by these vibrations. The faintest discharge in one ganglion-cell makes itself felt far and wide in others, but whether or not a vibratory impulse striking upon a cell shall discharge it, depends, we may suppose, on two considerations: (1) the strength of the impulse; (2) the condition of the cell in respect of *a*, exhaustion, *b*, self-control, *c*, the presence or absence of inhibitory impulses striking it from without. *a.* When a cell is completely exhausted and its capacity for discharging itself has been used up, it will manifestly fail to respond to external nervous impulses, though slight exhaustion, by diminishing self-control, may increase the liability to discharge. *b.* Self-control being probably part of the normal function of the ganglion-cell, the latter may from the very first, through imperfection of undiscoverable structure, be deficient in it, and partial exhaustion, as just observed, may at any time diminish it. But from whatever cause the deficiency arises, it is obvious that a cell deficient in self-control will, other things being equal, respond more readily to nerve-impulses than one endowed with the normal amount of self-control. *c.* It is well known that a ganglion-cell may be inhibited by nervous impulses striking upon it in a particular way: thus it may happen that a nerve-impulse which would of itself under some circumstances discharge a nerve-cell, may under others fail to do so, *e.g.*, when some other impulse or impulses are striking upon the cell at the same time.

These remarks may be applied to all nerve-storms.

The phenomena of megrim and some other neuroses suggest that exhaustion of the implicated nerve-centres takes some part in cutting short the attacks. After an attack of

megrim the patient may for some time expose himself with impunity to what are usually exciting causes, but when the time for another attack recurs (*i.e.*, when—we may suppose—the nerve-centres have stored up force for a fresh discharge), no amount of precaution will ward it off; and the vibrations which are perpetually occurring throughout the ganglionic network will be quite sufficient to cause the explosion. (It should be noted, however, that some specific plasmic influence may precipitate the attack.) How large a part *b* and *c* play in the phenomena I will not stop here to speculate upon.

The principles just enunciated may be better illustrated by epilepsy. For convenience we will consider only the highest sensory and motor ganglia—those, namely, in which, according to Hughlings Jackson, the abnormal discharge begins (= "highest level" fits).

An epileptic may be regarded as one in whom certain ganglion-cells are, owing to inadequate self-control (resulting from imperfection of undiscoverable structure) or to some defect in inhibitory action from without, excessively liable to discharge. Let us suppose that the individual has not had a fit for some time, and that the period has arrived when he may expect another; and let us further suppose that he is suffering from an intestinal worm which has been causing serious local disturbance. As a result of the latter, impulses will ascend to the highest sensory cells which, not being exhausted by a recent attack and being moreover unstable in constitution, will discharge; and from them impulses will pass to the highest motor cells with a like result. Thus there occurs a series of wild explosions in the highest cortical cells, and this is epilepsy.

The stronger the impulse striking upon a ganglion-cell, the greater is the tendency of the cell, other things being equal, to discharge. Supposing, therefore, a series of ganglion-cells to be, from some peculiarity of organization, liable to abnormal discharge, it is manifest that we should, as far as possible, protect them from impulses leading to such discharge. We can only in a minor degree control the impulses passing between one ganglion-cell and another, but we can to a very considerable extent control those passing up the several sensory system. The sensory nerves are distributed to (practically) every tissue in the body, and therefore from every

minute portion of the body-texture impulses are continually streaming upward to strike upon the central ganglia. Now if, in an individual whose blood plasma is perfectly healthy, and who is moreover shielded from all local irritation, a series of ganglion-cells undergoes abnormal discharge, the neurosis may be spoken of as spontaneous or idiopathic; but if some local irritation of sensory nerves, by developing a series of irritating afferent impulses, leads to abnormal central discharge, it may be spoken of as reflex. In all such cases "the amount of peripheral irritation needful to call forth the abnormal central state is in inverse proportion to the abnormal tendency of the centre. The latter may, as it were, be so fully charged with dynamite that it will explode spontaneously: as when an asthmatic or epileptic fit occurs though every care be taken to prevent any peripheral irritation. On the other hand, the morbid tendency may be so slight that a very intense peripheral irritation is requisite to bring out the morbid action."[34] This principle applies to every variety of nerve-storm.

Opinions differ as to the importance of peripheral irritation in the production of nerve-storms. Brown-Séquard first directed attention to the subject. "I will show," he says, "by an immense number of recorded cases, that insanity in its various forms. epilepsy, chorea, catalepsy, ecstasy, hydrophobia, hysteria, and all the varieties of nervous complaints, may be the result of a simple, often very slightly felt, irritation of some centripetal nerve."[35] There can be little doubt that this author has exaggerated the influence of peripheral irritation in the production of the several neuroses, and has not taken sufficient account of the central weakness; but on the other hand, I cannot but think that in recent times the influence of peripheral irritation has been underrated. Gowers, in his classical work on epilepsy, practically ignores it as an exciting cause of the epileptic fit, and similarly Anstie, in his admirable work on neuralgia, is at great pains to show that the essential cause of this disorder lies in the centres implicated.

While agreeing with the last-named writers in regarding central weakness as by far the most potent factor in the production of the various neuroses, I am nevertheless convinced that peripheral irritation also plays a very decided part.

Medical literature abounds in cases illustrating this fact, and although many of these are fanciful (especially those which have been recorded by the gynæcologists), many are genuine instances of reflex disorders. From the numberless recorded cases of reflex neurosis I select the following:

"CASE ——. A lad, æt. 12, had a fatty tumor on the right side of the neck. If this swelling were gently touched by the finger, or even by a feather, he instantly lost consciousness and was thrown into a most violent tetanic spasm. . . . Mr. Holden subsequently removed the tumor and all his various symptoms ceased."

In the light of such a case as this—and there are many strictly authentic cases equally remarkable—who shall say that reflex irritation takes no share in the causation of a neurosis seemingly the most spontaneous? Many sources of reflex irritation lie beyond the reach of investigation, and I contend that in all cases of central functional nerve disturbance, we should carefully seek for a local source: even if such irritation take no part in exciting the disorder, it may help to sustain, or to aggravate, it when induced.

The irritating impulses may start in any part of the body containing sensory nerves—that is, in practically all parts. A large number of peripheral expansions are, as just now hinted, beyond the reach of investigation, but the following sensory regions admit of more or less thorough examination, and their condition should be studied with the utmost care. Under each of the more important headings I have noted the principal sources of irritation.

The eyes—errors of refraction.

The ears—impacted cerumen.

The nose—affections of the nasal mucous membrane (catarrh, polypi); deflected septum.

The throat. The larynx. The heart and lungs.

The stomach—the various forms of dyspepsia.

The intestines—ditto; intestinal parasites.

The rectum—hæmorrhoids; fissure; ascarides.

The generative organs—internal. External—too long prepuce; pruritus rubræ.

The urinary system—calculus.
The scalp—pediculi.
The skin—pediculi; eruptions; tumors pressing on nerves.

It is a good plan to have all the above sources of irritation in mind when a case of nervousness comes before us. To make a detailed examination of each region indicated would be a laborious proceeding, and is fortunately seldom necessary; but the possibility of local irritation in any one of them should ever be before us, and I am convinced that the more thorough our examination, the more likely is our treatment to be successful; and that the most accomplished physician, unless well alive to the possibility of some peripheral irritation, will very frequently overlook some important hints as to treatment.

At the same time we have to be careful not to attribute too great an influence to irritation in any one region. This is one of the dangers of specialism. The specialist is apt to think that every disorder for which a patient consults him has its origin directly or indirectly in that organ which he makes his special study: the throat specialist thinks to find it in the throat; the aurist in the ear; the gynæcologist in the generative organs. Nor can we wonder, for the specialist, who is also often an exclusivist, soon learns to forget or to think very lightly of diseases outside his own particular province; those pertaining to his narrow specialty make up his whole clinical and pathological world, and thus he regards every symptom of which his patient complains from an altogether one-sided point of view. And the more exclusive the specialist the more of course is he biassed in this way. Thus the gynæcologist is the most exclusive of all practitioners; for, "l'utérus, c'est la femme"; the eye-surgeon, on the other hand, who is for the most part a general surgeon as well, more readily recognizes the fact that the subject of his special study forms but a small part of a vast and complex organism. Yet who shall say that in the production of neuroses the eye plays a part altogether insignificant as compared with that of the uterus and ovaries?

That he may avoid shipwreck on this rock let the physician acquire a sound practical knowledge of each specialty. If half the time at hospital that is devoted to the acquisition of

theoretical and only very indirectly useful knowledge, were spent in the study of special diseases, we should turn out men much better equipped for their work, and at the same time strike at an ever-increasing danger. Why should not the "first-year's student" proceed at once to study the diseases of the eye, ear, throat, nose, and skin? He might make considerable advance in all these specialties without any profound knowledge of anatomy or physiology; and he would come to the study of the anatomy and functions of these organs with a zest and interest which are often wanting.

The above table is very imperfect. I have only indicated a small number of those disorders of the various sensory peripheries which may reflexly call forth central disturbance, and I have moreover made no mention of the special nervous disorders which may be thus excited. It must be noted, however, that irritation of a particular sensory expansion tends to call forth its own peculiar train of phenomena. Thus irritation of the ophthalmic nervous system (notably that which is induced by errors of refraction) is one of the commonest causes, perhaps the commonest cause, of frontal headache, and a very frequent cause of megrim; disease of the nasal cavities is a fruitful source of asthma, "muddle-headedness," headache, and inability to fix the attention.[36] Similarly, impacted cerumen in the external auditory meatus is apt to induce its own characteristic symptoms.

It is not my intention to consider here the various trains of symptoms which are more or less peculiar to irritation of the several peripheral expansions, as this would require a large space, but it is necessary to make special mention of disorders of the internal generative organs in the female as reflex excitants of nervous disturbance. The sensory nerves which have their origin in these organs probably take a large share in generating the emotions. Hence disorders of them are apt to exercise a marked influence over the emotional being, and may thus play some part in inducing the hysteric state. Indeed, it is possible that irritation of this particular expansion is more calculated to excite hysteria than that of any other; the most terrible uterine and ovarian diseases may, on the other hand, exist without any nervous disturbance whatever, and it is the experience of most reliable physicians that the functional nervous disturbances in women are gen-

erally best treated by attacking the central nervous system directly. Of the various sexual disorders helping to cause nervous disturbance, menstrual irregularities are, in my view, by far the most important; they practically never occur without it, and although the disturbance may be in some cases the cause of the irregularities, there can be little doubt that it is frequently the result. The influence of uterine displacements and abrasions, etc., of the cervix in provoking nervous disturbance has, as J. Matthews Duncan has so vigorously insisted, been grossly exaggerated.

In seeking for a cause of nervous disorders in the internal genitalia we should above all be careful lest by implanting in the patient's mind the belief that all her sufferings have a local cause, we establish a new cause of trouble instead of removing an old one. For, once such a belief has become rooted in the mind of a nervously disposed woman, it may follow her to the grave, and she will ascribe all her pains and aches to a disorder which has no existence except in the imagination.

CHAPTER XI.

TREATMENT.

THE publication of Weir Mitchell's work on "Fat and Blood" may be said to mark an era in curative medicine. Although before its publication the importance of improving the nutrition of the anæmic and emaciated neurotic had been tacitly acknowledged, and treatment already directed to this end with greater or less success, yet it may safely be said that till its appearance no physician had sufficiently insisted upon the vital necessity of influencing the quality of the blood and the general nutrition of the body, and certainly no one had devised a method of attaining these results so systematic and effectual as his. Attention had, instead, been futilely directed to the treatment, by drugs, of what were merely symptoms, the evil remaining totally unarrested at its source.

We find among the nervous all degrees of mal-nutrition, from scarcely perceptible anæmia or loss of weight, to such utter starvation of the body that the wonder is how life can any longer continue. We saw that the undiscoverable structure of the nerve ganglia may be affected through the blood-plasma; directly the latter becomes impoverished the undiscoverable structure tends to undergo dissolution, and symptoms of nervousness develop, the rate and depth of the dissolution, the intensity with which the symptoms consequent on such dissolution appear, and the rate of their appearance depending upon the innate hardiness—so to speak—of the ganglionic structure. Clearly, then, the only rational plan of treatment in such cases is that which aims at enriching the impoverished plasma, "filling the vessels with red blood," and bringing the body weight up to the normal standard. Specific drugs and other remedies may check for a time the urgency of the symptoms, but in the more serious cases we cannot reckon upon a permanent cure until the blood and the tissues generally have regained their wonted condition

The method of achieving these ends differs in different cases. In the slighter degrees of mal-nutrition, such as result from overwork or improper diet, tonics and a careful regimen may suffice; in more serious cases rest and change of air and scene may be needed. Often, however, the mal-nutrition is of too long standing, the dissolution too profound, to be remedied in any of these ways. The exhausted nerve-centres require absolute repose, and to insure this it becomes necessary to send the patient to bed. This done, it often happens that, notwithstanding the seriousness of his condition, simple rest aided by suitable and regularly administered diet will suffice to restore him to health without any further measures. How many patients who come into hospital quickly recover under this treatment—patients who present a series of anomalous symptoms, and to whose disorders it is frequently impossible to give names; who, in fact, need only rest and good food! Many cases of nervousness may be cured in this simple way. Quite recently I heard of an English lady who while engaged as a governess on the Continent had sunk into an extremely nervous state, and not wishing to consult a "foreign doctor" resolved to take her own case in hand. Having heard of the Weir Mitchell treatment, she determined to try it so far, at least, as rest and ample feeding were concerned. She accordingly went to bed for a fortnight, and at the end of that time regarded herself as cured.

In the most serious cases, however, it is necessary to adopt the Weir Mitchell treatment in its entirety—including, as it does, isolation, massage, electricity, and feeding up. Thus, just as there are grades of nervousness so are there grades of treatment, and one of our chief difficulties is to determine to which the patient shall be subjected. It is not correct to suppose that he has no alternative between undergoing the treatment in its full rigor, and being simply treated by tonics, rest from work, or change of scene. The opinion is, I believe, rather prevalent that the Weir Mitchell treatment carried out in full detail is only suited to the chronic, bed-ridden, and emaciated hysteric; but although this kind of case is the field in which its most brilliant results are achieved, yet it will also often cure other forms of emaciation and nervousness not due to organic disease. The following case bears out this statement:

Man, æt. 33. Sensible and intellectual, with no organic disease, but very nervous; height, 5 feet 11 inches; weight, three years ago, over 12 stone, now only 9 stone 2 lb. His illness began with dyspepsia for which he consulted doctor after doctor in America and England and underwent many different forms of treatment, but always without successful result. One treatment required him to draw off the contents of the stomach four hours after each meal, with the object of ascertaining what had not been digested by that time, that it might be avoided in future! In this way his dietary was curtailed of one article after another till only two or three were left. As might be expected he grew thin and anæmic, and dissolution of undiscoverable ganglionic structure evidently began. He became intensely self-centred—and what wonder—and so prostrate that the slightest exertion, even the mere effort to think, exhausted him. A long train of nervous phenomena now set in, the most marked being mental, as is generally the case where a mind naturally vigorous and of high order becomes disorganized. The social instincts (latest to be evolved and therefore first to go) having completely vanished, all the powers of a gifted and cultured intellect were turned inward in self-contemplation in spite of the strongest efforts of will. In this state of intense anæmia, emaciation, and confirmed hypochondria, and after he had visited various watering-places at home and abroad without benefit, I first saw him. Now I protest against pooh-poohing the "whims" of such a patient; it is sheer nonsense to tell a man in this condition that there is nothing really the matter with him, that it is all his "fancy," and that if he will only think less of himself and more of others he will get well. No one could more thoroughly realize and deplore his own moral disintegration than did this patient, yet while he deplored it, he was quite incapable of freeing himself, by any effort of will, from the net of morbid feelings and fancies in which he had become entangled. The nerve-centres were far too exhausted to allow of any such effort, and no abatement in his nervousness was possible until their undiscoverable structure had been built up again by an enriched plasma. Clearly here was a case for determined treatment under direct supervision. I accordingly ordered him to bed, and seeing that no half-measures would avail, I put the Weir Mitchell method in full force. After a few days

he was placed upon the superabundant diet, and massage was administered. He is now rapidly putting on flesh, and is fast recovering his normal tone of mind.

It is not within the scope of a book like the present to describe in detail the various methods of enriching an impoverished blood and of improving the nutrition of the body: my object is simply to press home the fact that in all cases of nervousness in which there is anæmia or in which the patient is below his normal weight, our great aim should be to "fill the arteries with red blood" and raise the body weight to the normal level, drugs being only useful as adjuncts to our treatment. We can always, practically, succeed in this when there is no organic disease. The most hopeful subject is, of course, the ill-nourished neurotic, for obviously in his case improved nutrition will lead to improvement in his nervous condition; when the patient suffers from nervousness in spite of good nutrition, his case is more serious; the root of the evil lies deeper, and has to be reached by other methods. But even then he should be very careful to take his food regularly. Regularity in meal-times is desirable for all, but doubly so for the neurotic, by whom fasting is ill tolerated even in health. "Epileptics," writes Dr. Liveing, in his classcial work on megrim, "so far as my experience goes, bear abstinence ill, and I have often been surprised at the rapid way in which they become faint if they are kept waiting beyond the time of their accustomed meals." He also notices that Galen observed this more than 1700 years ago. I believe, however, that not only the epileptic, but all who are nervously disposed can ill endure long fasts: their nerve-centres cannot bear even a temporary starvation. Thus I have frequently observed mental depression as well as faintness result from long abstinence on the part of such, both symptoms at once disappearing on the taking of food. Of course depression often occurs in the nervously disposed after food also, but the cause in this case is ptomainic poisoning of the nerve-centres resulting from some form of indigestion.

Outdoor Exercise.—All physicians are agreed as to the advantage of outdoor exercise in almost every disease which is not acute, and in no case is it more beneficial than in functional disorder of the nervous system. There is indeed no

nerve-tonic to be compared in efficacy to fresh air. Thus Liveing insists upon its importance in the treatment of megrim; Salter, of asthma; and R. Reynolds, of epilepsy. As might be expected, therefore, outdoor exercise is highly beneficial to the habitual blusher; it improves the general health, exerts a favorable influence upon the vaso-motor system, and by removing the unnatural pallor so common in those who spend the greater part of their lives indoors, renders the blush, when it does occur, less remarkable. The beneficial effect of outdoor exercise on the nervous is easily explained. Man is by his origin adapted to an outdoor life; his natural home is the open; he has evolved from the lowly amphibian not as a sedentary creature confined within four walls, but as an active being living under the free canopy of heaven. Hence the open air is his normal environment and he is never so healthy as when he is constantly in it. I have elsewhere argued that all diseases are natural variations, that they are for the most part of recent ancestral origin, and that recently acquired characters are very unstable, very apt to disappear. When therefore an individual is suffering from any given disease we may compare him to a plant which has recently been made to vary in a particular way. Now, placing such a plant in its pristine environment generally causes it to revert to its pristine condition—to throw off those characters which have been impressed upon it by artificial conditions. And in like manner an individual who is afflicted with disease (= a pathological variation) tends, when placed in that environment which may be regarded as his natural one, to throw off his recently acquired characters and to revert to the *status quo ante, i.e.,* health.[37]

Excessive open-air exercise, or, in fact, any violent muscular exertion, has, however, in the case of the nervous, to be guarded against, and it is sometimes necessary to prohibit it entirely, as, for instance, in the case of the highly anæmic and emaciated neurotic who needs rest before all things. In this connection I may call attention to a curious fact which I have often noticed; viz., that mental and physical fatigue do not always go hand in hand. I have seen persons physically worn out and prostrate after a long spell of overwork, mental and bodily, yet still capable of close mental application; indeed, I am acquainted with a lady whose intellectual faculties, far

from being blunted, are actually sharpened under pressure of excessive work, and this in spite of severe headache. In her case overaction does not express itself, as it should, by a sense of mental incapacity for the time being, but rather by increased mental activity. Persons of this type run great danger of doing themselves grave injury; did the incapacity for further mental effort make itself felt as soon as the sense of fatigue, they would leave their work perforce ere it passes physiological limits; as it is, they are tempted, if it is urgent or engrossing, to disregard the feeling of fatigue (which, like other pains, should serve as a warning) and to subject themselves to a mental overstrain which others, differently constituted, escape.

In regard to the influence of rest, many patients have told me that, when the flushes come on, they derive great relief from lying down.

Regularity in respect of food, rest, and exercise is an invaluable means of securing and maintaining health. I am convinced, to take an example, that ninety-nine hundredths of the delicate children among the well-to-do are not delicate by virtue of any innate weakness, but in consequence of an irrational system of bringing up, which, instead of insisting upon regularity in diet, hours, and the like, lets all be subject to caprice, sometimes of the parent, more often of the child itself. Children are very seldom innately weak; this truth might be arrived at a priori, as I have elsewhere shown, and it can be proved a posteriori by any one who will take the trouble to follow carefully the circumstances of a child's career. It will practically always be found that it is the system of up-bringing, not the child, which is at fault. I illustrate the importance of regular living by reference to the child, partly because I have recently been much impressed by it myself, and partly because in his case the ill-effects of irregularity can be readily seen. But what is true of the child is obviously true also of the adult. I need scarcely allude to the irregular system of diet which obtains among the lower classes, especially among the women, and to the evils it entails. Having to prepare their own food and being often enough worn out by the work and anxiety consequent on large families, they are apt to neglect their proper, regular meals, and thus drift, unknown to themselves, into chronic dyspepsia and so into

actual starvation. Many more are, I believe, starved in this way than from absolute want.

Digestion.—We have seen that flushes are often secondary to dyspepsia; we should therefore be very careful to look to the digestion in all cases of flushing. In fact, this function should command close attention in all forms of nervousness, seeing that disorders of it are apt to lead to vitiation of the blood, and consequently to disturbance in normal nervous function. This vitiation may be caused by the undue accumulation of poisonous ptomaines, or by inefficiency in those structures whose office it is to render them inert. There seems little doubt that the liver plays an important part in this respect; and we should therefore be on the alert to detect any disorder there. When such is discovered the following mixture may frequently be given with great advantage for several mornings in succession on rising, especially to plethoric women at the climacteric.[38]

Am. chlor, ...	gr. x.
Ext. tarax. liq., ...	ʒ ss.
Decoct. aloes co.,	
Inf. gent. co., ...	āā ʒ v.
Sodæ pot. tart.,	
Tinct. lavand. co., ...	āā ʒ i.

If the liver is not sufficiently active, another dose should be taken in the middle of the day; if too active it should be taken every other, or every third day. Or we may substitute for this medicine the old-fashioned remedy of a blue pill taken at night and a dose of salts in the morning. There is no need, however, to enter here any further into the treatment of dyspepsia. I merely wish to insist upon the very great importance of looking into the state of the digestive organs in all forms of nervousness.

The Skin.—Great attention should be paid to the skin. The best way of acting upon this tissue is undoubtedly by bathing and by free bodily exercise. Many nervous symptoms are caused by the stimulation of nerve-centres by certain effete matters, and we should therefore—to remove these—direct our efforts to raising the excreting power of the several emunctories to their full capacity. A due amount of bodily exercise, daily hot baths and soaping the entire surface of the

body, as recommended by Sir Erasmus Wilson, are the best means of getting the skin to act vigorously. The alkali of the soap unites with the fatty acids (these are apparently not excreted as such, but are the result of secondary decomposition) so abundantly present upon the surface of the skin, and in this way the organic excreta are easily got rid of. There can be little doubt that by the use of soap the excretory action of the skin is increased.

When the skin is abnormally dry, its action is best promoted by means of Turkish baths, or we may give acetate of ammonia or other sudorifics. According to Tilt[39] a flush is relieved by perspiration; therefore he argues that in all dry flushes we should get the skin to act. In some of my cases, however, the symptoms were most distressing just at the very time that perspiration occurred. Moreover, it does not follow that, because the flushes are dry, the excretion of the skin is upon the whole defective, for the patient may perspire abundantly when not flushing. It is only, therefore, when the quantity of perspiration in the twenty-four hours is decidedly below the normal that we need recommend Turkish baths or sudorifics. Defective or excessive excretion by both the sudorific and the sebaceous glands is not uncommon among the nervous, and is manifestly the result of faulty nervous action. Excessive secretion of sebum is less frequently observed than excessive perspiration; I have, however, noticed it. Thus a patient after a nervous seizure became "oily all over." It is as a rule best not to give any special drug to diminish excessive perspiration in the cases we are considering.

Baths.—By means of baths we are able to act directly upon the vaso-motor system, so susceptible in nervous patients, and at the same time to improve the general health.

a. Cold baths cause contraction of the cutaneous arterioles. After the bath these dilate, and there is then a glow over the entire surface of the skin and a general sense of exhilaration. Sometimes, however, dilatation occurs too soon—*i.e.*, in the bath; or the vessels may not contract at all, dilatation continuing during and after immersion. On the other hand, the contraction caused by the bath may continue for some time after it. In any of these cases the cold bath is injurious. Some persons can never be got to tolerate it. Take, as an extreme case, an individual afflicted with well-developed Ray-

naud's disease, when even a blast of cold air may suffice to cause fatal contraction. In others the morbid tendency is less developed; it may, in fact, be so slight that we find it difficult to decide whether the case is one of genuine Raynaud's disease or not, and the individuals may pass through life without being regarded as the victims of any complaint. They merely notice that they are very susceptible to cold, and that they cannot take cold baths like other persons. In such instances we have examples of health so imperceptibly shading off into disease that we cannot say where the one ends and the other begins. (This may occur in the case of practically any disease, and is not sufficiently recognized; nay, it is scarcely recognized at all. The only author who has touched upon the subject, so far as I know, is J. Hutchinson, in his recent oration on the "Clinical Uses of Rare Diseases." Do we not too dogmatically assert that an individual either has or has not epilepsy, hæmophilia, paralysis agitans, etc., oblivious of the fact that in each of these perfect health imperceptibly shades off into the fully developed and unmistakable disease? Were disease a material entity, did it consist of a something which might be cut out of, or distilled from the body, we might be thus dogmatic in our diagnosis; we might say either the entity is in the body, or it is not in the body. But this crude conception of disease is clearly erroneous. Disease is morbid function, morbid vital action, an improper interaction between the organism and its environment, and thus there being every conceivable grade between perfect and imperfect interaction, it is obviously impossible to draw a sharp dividing line between the one and the other—between absolute health and unmistakable disease. Pathologists, moreover, blind to the fundamental truths of biology, are still too much inclined to regard diseases as more or less fixed and unchanging types; whereas it would perhaps be correct to say that the diseases which cannot be named are more numerous than those that can.)

While, however, there are some who can never be got to tolerate cold bathing, there are many who, though very susceptible to the influence of cold, can yet be trained to it. The bath should at first be tepid, and its temperature should then be gradually lowered from day to day. Its duration should vary with the temperature. Thus a comparatively long im-

mersion in tepid water is to some extent the equivalent of a momentary plunge into cold. Making due allowance for this consideration the duration of the bath should be gradually increased, but with this precaution, that it should never last more than a few seconds in winter. A little warm water may be added in very severe weather to take off the chill; but, as a rule, it is best not to raise the temperature when once the patient is able to take the genuine cold plunge. The beneficial effect of such a bath is due to the fact that, its temperature equalling that of the atmosphere at the time, the cutaneous vessels are made to contract to a degree equal to, or greater than, that which the atmospheric temperature of the time is capable of causing. During menstruation the bath should be taken tepid (the temperature being afterward gradually lowered again) or it should be discontinued. The beneficial effects of cold water may be heightened, and any injurious effects it may have minimized, by adding to it certain substances. It is now known that the various mineral waters do not, when used for baths, exercise specific effects, all the various salts having but one and the same action. But water containing a certain percentage of salts stimulates the skin more readily than distilled water, and therefore common salt may with advantage be added—say, in the proportions of ten pounds to fifty gallons. Such an addition will be found beneficial in every case, and it or some equivalent should always be recommended for those patients whose skin does not properly respond to cold. Even more beneficial than salt baths for such patients are baths containing turpentine. These were recommended by Tyler Smith, but seem to have fallen into desuetude. The following may be added to a bath of fifty gallons:

Common soda, ...	2 lbs.
Oil of turpentine, . . .	2 pints.
Oil of rosemary, ...	half an ounce.

Tyler Smith observes that in the coldest day in winter such a bath may be employed with the greatest safety. "A sense of calmness and tranquillity very frequently follows a previously disturbed, irregular, or excited condition of blood," and the skin becomes "velvety and soft."

After the bath the skin should be rubbed vigorously with

a rough towel, or better still—when it is fairly dry—with the warm, bare hand. This should be continued until the whole surface glows. The patient should never feel cold after the bath.

There are, I find, very few, excepting of course those afflicted with some serious organic disorder, or those showing a decided tendency to Raynaud's disease, who cannot, by some such graduated system as I have indicated, be got to bear cold water baths. I have myself never seen any evil result from their use with the precautions above mentioned, and I even recommend them up till the last days of pregnancy. Unfortunately, one has often a deep rooted prejudice to fight against.

By a course of cold baths, the vessels of the skin become gradually accustomed to respond readily to external cold, and the patient is thus much less apt to "catch cold" from sudden chill. It is possible also that the vaso-motor centres are in this way so influenced that they become less liable to the many varieties of erratic explosion common in the nervous. More probably, however, the beneficial effect of cold bathing in these cases is due to the improvement in general health which almost invariably follows upon their use.

b. Tepid baths exert a sedative effect upon the nervous system. Highly nervous patients may sometimes derive considerable benefit from remaining for two or three hours in a bath in which the water is from 93°-94° F. In this way a large surface of skin with its vast expanse of sensory nerve-endings is brought under the sedative influence of the tepid water.

c. Hot baths. It is scarcely necessary to insist upon the advantage of hot baths to nervous patients. The cold bath in the morning may frequently be combined with the warm bath in the evening, when the entire surface of the body should be lathered with soap. A warm bath sometimes relieves in a remarkable way the aches and pains so common in nervous women, especially at the climacteric, and it is one of the best hypnotics we possess. Hot mustard foot-baths are useful for cold feet.

d. Turkish baths are chiefly useful as a means of inducing sweating. The habitual frequenter of Turkish baths knows by experience how long he should remain in the several rooms;

if the patient has never been in a Turkish bath before, he should be cautioned to spend some time in the coolest chamber.

Bleeding.—Bleeding often does great good when the subject of flushing is plethoric, but when thin and anæmic it is obviously harmful. During the first months, or even years, after entire cessation, and during the long intervals of complete amenorrhœa which are apt to occur at the change of life, the woman is apt to become plethoric, and to suffer in consequence from flushes and other nervous phenomena. The latter are chiefly referable to the head *e.g.*, giddiness, a sense of fulness, and other anomalous sensations. The patient moreover suffers from great mental irritability: she is apt to start at the slightest noise, to be irritable with her children, despondent, and ready to burst out crying on trifling provocation, or, indeed, without any provocation whatever. All these symptoms are met with at the climacteric, whether the woman be full-blooded or not; indeed, they may be present in the intensely anæmic and emaciated, but they—and especially the excessive mental irritability—are peculiarly apt to occur in those plethoric women who have not been relieved by a free menstrual flow. Such are beyond all doubt benefited by bleeding. W. Tyler Smith was an ardent advocate of bleeding in certain cases at the climacteric; he observes that the effect is often marvellous.[40] How the depletion does good it is difficult to say. It is now known that the withdrawal of blood, except in dangerous quantities, does not permanently decrease the blood-pressure, owing to a compensatory vasomotor constriction, and to a rapid absorption of fluid from the tissues. The effect of the latter process is to diminish the specific gravity of the blood, the plasma becoming more watery, and the number of the blood-corpuscles less, and possibly it is to this lessening of the specific gravity that the good results which follow from bleeding, in the class of cases described, are due.

The plethoric generally bear bleeding well, but it must be remembered that individuals differ in this respect, apart altogether from their condition of full-bloodedness or anæmia. The loss of a single ounce of blood may in one individual cause faintness, while another will lose sixty or seventy ounces without inconvenience.

The blood may be drawn by means of the lancet or of

leeches. In the former case the operation should be performed with the patient in a sitting posture so that any sign of faintness may be at once detected. (Bleeding is so seldom performed nowadays, that it is perhaps advisable to briefly describe the operation here. It is most convenient to bleed from the arm. This should be compressed above the elbow. The patient then grasps some firm object in the corresponding hand, and is directed to make occasional pressure upon it, so that by bringing the muscles of the arm into action, the flow of venous blood may be facilitated, and the operator then opens the largest superficial vein at the elbow—generally the median basilic. The incision should be longitudinal or slightly oblique. After the requisite quantity of blood has been lost, the part is bandaged.) Patients, however, generally object to the lancet.

Leeches may be applied to almost any part of the body. The best situations are: *a.* Behind the ears. This is perhaps the best situation when the head symptoms are pronounced, as possibly the brain may be more directly affected by the removal of blood from this part than from a more remote one. *b.* The cervix uteri. It seems rational to draw off blood from this part when the plethora is due to defective menstruation; but some authors contend that it is unwise to attract blood toward the uterus at a time when the internal generative organs are undergoing involution. There is some difficulty in applying leeches to the cervix, but this difficulty may be overcome by employing an instrument devised for this purpose by W. Clegg.[41] *c.* The groin. This is in the cases under consideration probably the best situation, for the blood lost from here comes from a vascular area very closely related to the uterine area, and yet quite separate from it. It is moreover the least unpleasant position. *d.* The anus.

After the application the patient may be placed in a warm bath; in this way it is said that much blood may be lost without producing exhaustion. I have never recommended this plan myself, not because I doubt its efficacy, but because the loss of blood in this way must necessarily be a highly disagreeable experience to the patient.

When the patient will not submit to the withdrawal of blood by either method, we must rely entirely upon the effects of exercise, moderation in diet, increase of cutaneous action,

and the use of hydragogue purgatives. In marked plethora, however, no treatment is so efficacious as bleeding.

Electricity.—It seems to be pretty generally recognized that electricity may be employed with great advantage in many forms of nervousness. Cases of flushing and blushing are occasionally benefited by it; but whether the good effects are simply due to the improvement in general health brought about by its means, or to a more direct action on the vaso-motor system, it is difficult to say—probably the former, seeing that the storm is in all probability not primarily vaso-motor in origin. Obviously, if we want to get at the vaso-motor nerves of the face, we must attack the cervical sympathetic, which supplies the entire head (including the brain and neck) with vaso-motor nerves. The galvanic current is preferable; one electrode should be placed at the nape of the neck, the other behind the ear, and the latter should be drawn up and down the line of the sterno-mastoid muscle. It should be remembered, however, that the sympathetic is deep-seated, and it is therefore doubtful whether it is in this way stimulated in any appreciable degree. It is also doubtful whether much benefit accrues from attacking the vaso-motor nerves, seeing that nerve-centres—not nerves—are the great regulators of vaso-motor action. In some cases, especially where there is much central exhaustion, better results may be obtained by attacking the brain. Mild galvanic currents should be applied by means of large electrodes every day, or every other day, for a few minutes at a time. It is generally best to apply the anode to the forehead, and the cathode to the back of the neck; another good plan is to place the electrodes on either side of the head. Weak general faradization may sometimes be advantageously employed in conjunction with the above.

Counter-irritation.—Counter-irritation is of great service in nervousness.

a. Spongio-piline. A very convenient way of mildly stimulating the skin is to apply a piece of spongio-piline which has been previously dipped in very hot water and wrung out.

b. Linimentum Sinapis Co. When gentle and long-continued stimulation of the skin is required, this is, of all liniments, the best. It may, as Gamgee has insisted, be rubbed in for a long time without producing the slightest eruption. This preparation is often sold impure.

c. Chloroform. The liniment of chloroform is a very useful stimulant of the skin. A very good method of counter-irritating is to apply equal parts of chloroform and castor oil to the skin, and then cover the part with oil silk.

d. Dry cupping. This old-fashioned treatment is not used as frequently as it ought to be. It is one of the best modes of counter-irritating. Instruments are now made by which the operation may be much more simply performed than on the old plan.

e. Hot iron. A flat-iron—as hot as can be borne—pressed against the skin produces effective counter-irritation.

f. Blistering. This will ever remain a powerful therapeutic agent. In blistering for nervousness the following points should be borne in mind. The blister should seldom or never be employed in cases of marked debility or prostration. It should be small—not larger than a pea—and the application should be frequently repeated, otherwise the effect is not likely to be permanent. The advantage of using small blisters is that we can by this means graduate the treatment better. Some are very susceptible to their influence. The position of the blisters should, of course, vary according to the nature of the case to be treated. In general nervousness they should be placed vertically on either side of the spinous processes. Very small blisters arranged in this way cause little inconvenience in movement, or otherwise.

g. The Paquelin cautery. As a rule patients object to the use of the cautery, although the pain produced by it, if properly applied, is only slight. The skin should be lightly touched by it, and vesication and scarring should never result. The applications should be made on either side of the spine to the extent of two or three inches every day. Starting in the lower cervical region, the operator should gradually work downward, till at the end of ten to twelve days the sacral region is reached.

Sedative Applications.—There is no need here to enumerate the various sedative applications which may be employed with advantage in many cases of nervousness. I will merely mention the great benefit which often results from the application of the spinal ice-bag, as recommended by Chapman.

CHAPTER XII.

TREATMENT BY DRUGS.

External Applications.—The following dusting powders recommended by Tilt will occasionally be found of service in flushing:

℞	Carmine,	½ grain, or less.
	Nitrate of bismuth,	ʒ i.
	Camphor,	ʒ ss.
	Oil of bitter almonds,	♏ ij.
	Starch,	℥ i.

℞	Carmine,	gr. ½.
	Camphor,	ʒ ss.
	Oxide of zinc,	ʒ i.
	Attar of roses,	♏ i.
	Starch,	℥ ij.

I may here mention the influence of the local application of water in blushing. In one patient bathing the face in cold water increased the tendency to blush; in another it distinctly lessened it for a time.

The effect of heat in the following case was remarkable:

Woman, æt. 23. Subject to blushing from childhood; blushes worse the last eight years. An attack early in the day frees her for the remainder of the day; so also if she gets her face very red by bathing it in hot water or by sitting close to the fire. One side of her face gets red and heated from the fire; she will not blush for the remainder of the day on that side, but will on the other. When going to an evening party she avoids an attack by getting her face thoroughly red beforehand.

The next case is somewhat similar:

Woman, æt. 52. Suffers from blushing. An attack seems to free her from the tendency to blush for a time, for, knowing

she has had one, gives her confidence in herself, and she does not fear another. If her face becomes heated and red from being too near the fire, she experiences the same immunity.

For Internal Administration.—There are, apparently, but few drugs which exercise a specific influence on flushing and blushing, though there are several which, by improving the general health, may lessen the tendency to them, notably to flushing. As regards drugs acting specifically, one naturally looks to those which influence the vaso-motor system, but seeing that the vaso-motor phenomena of the flush and blush storms are almost certainly secondary in origin, it is not surprising that the expectation is not always realized. I have thought that some of the following drugs have acted specifically, certainly they have done good, more especially in flushes.

Ergot, owing to its action on the arteries, naturally suggests itself as a possible specific. In some cases it has certainly proved efficacious. I give ten to thirty drops of the liquid extract three times a day.

Turpentine is a very valuable drug, one of the most valuable we possess, and were it not for its unpleasant taste would doubtless have long ago become very popular. Especially is it useful among the poorer classes. The poor, especially the women, suffer very largely from a slight degree of scurvy; they also suffer much from flatulent dyspepsia and from nervous debility, all of which turpentine relieves. Whether acting directly or indirectly, it certainly often does good in flushes. It may be prescribed in capsules, or as a mixture containing ten drops of the oil three times a day. It may advantageously be given with mucilage, glycerin, bicarbonate of soda, and with oil of cassia which is a capital flavoring agent.

Oleum eucalypti and oleum anthemidis (1 to 4 drops of either) will sometimes be found useful in general nervousness accompanied by flushing.

Nitrite of amyl and nitro-glycerin both seem to exercise a decidedly specific influence on flushing.

Sulphur is an old-fashioned remedy for nervousness at the climacteric, and it occasionally does good in flushes. It is best administered in the form of a lozenge, recommended by

Sir Alfred Garrod, and containing five grains of milk of sulphur to one grain of cream of tartar. One of these lozenges may be taken every night for an indefinite period.

The bromides (of potassium, sodium, and ammonium) are of course useful in most forms of nervousness, but they certainly do not exert the same specific effect upon the flush or blush as upon the epileptic fit. I generally prescribe the bromides with small doses of strychnine.

Iron is one of our most useful drugs in flushes, but whether it acts specifically or simply by improving the general health, it is difficult to say. Even plethoric women suffering from flushes are often benefited by it. It may be given with strychnine and quinine.

Citrate of quinine I may also mention, because one patient was able to stop his blushing by placing a few grains of this drug upon his tongue. I have not hitherto seen a similar result in others.

Other drugs which may be used are: musk, sumbul, castor, camphor, henbane, valerianate of zinc, phosphate of zinc, cimicifuga, aconite, ignatia, citrate of caffeine, antipyrine.

The Administration of Stimulants.—A few words may here be said on the use of stimulants. Alcohol should as far as possible be avoided by those who are liable to flushes. As the faintness attending the flush, and the other morbid symptoms so common at the climacteric, are very readily relieved for a time by stimulants, there is a great temptation to continually resort to them, and thus the individual runs the danger of drifting into confirmed dram-drinking. In such cases ammonia, sulphuric æther, and nitroglycerin are admirable substitutes, and I prescribe them freely. L. Beale has given as much as twenty-five grains of carbonate of ammonia in an ounce of water three times a day.

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ALCOHOLISM IN WOMEN.

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ALCOHOLISM IN WOMEN.

CHAPTER I.

In the course of my medical career, and especially since I was placed in charge of the female wards and of the maternity at the Hôpital de Lorient, I have succeeded in collecting a large number of cases of alcoholism in women. The conclusion to be drawn from this material is that, in Brittany at least, this affection is met with as frequently in women as in men.

This rule is probably not general, but I can affirm that in our maritime regions the passion for strong drink is met with equally in both sexes, and that it daily makes lamentable progress. The reason of this appears to me to be as follows:

Sailors' wives, being exempt from all necessary work by the absence of their husbands, give themselves up to a lazy and idle life. The wives of dock laborers, carried away by example and evil company, do the same thing, and lose the moral qualities of the mother of a family. The wives of agricultural laborers, by reason of their frequent intercourse with the two preceding classes, copy their independent ways and contract the same habits, particularly that of intemperance.

It is the custom of these women, especially the peasants, among whom are some of fair intelligence, to assemble on certain days, each one contributing her quota, in order to procure a sufficient quantity of her favorite beverage.

I can testify that most of these women consume as much strong drink as men, but they appear to stand it better. It is probably because, having nothing else to do, they drink every day ; but, whether from self-respect or from fear of family reproach, they drink methodically, so as to preserve their mental balance, and they succeed thus in consuming large

quantities of alcoholic liquors, without producing any very manifest effects on their constitution, and without there being any drunkenness, properly so called.

Men, on the contrary, who work hard every day, do not drink, as a general rule, excepting on Sunday and Monday; but then, having been deprived of their favorite tipple during the entire week, they drink enormous quantities, and their drunkenness is much more marked than that of their wives; theirs being an intermittent drunkenness, which soon leads to chronic alcoholism; while in women, whose drunkenness is latent, so to speak, acute and chronic forms are rare; but in them the third form, the subacute, which I am trying to describe here, is exceedingly common.

Let us briefly summarize the general opinions of the medical profession regarding alcoholism.

Alcoholic drinks produce:

1. An acute poisoning, drunkenness, which presents three stages:

a. A stage of excitement, often of gayety.

b A stage of incoherency or wandering, with unsteady gait.

c. An apoplectiform stage, which disappears generally by a more or less prolonged sleep and in which death may take place.

Some women become intoxicated with the greatest facility, but in these women the third stage is rarely reached. Others, on the contrary, are but slightly affected by alcohol; pregnancy and hysteria appearing to be efficient agents in establishing the immunity.

2. Chronic alcoholism, always described by authors after the acute form, is, according to them, less frequent in women than in men. It is a true poisoning, nearly always observed in dock-laborers and especially in old sailors, as I have already remarked to Dr. Lancereaux.

We have often had occasion to observe cases of chronic alcoholism in women after the menopause; but no author has ever spoken of subacute alcoholism.

Etiology of Subacute Alcoholism in Women.

The position that women occupy in society determines the nature of their favorite drink; but, generally speaking, women

do not use as strong drink as men. Women as a rule prefer the so-called aperients and alcohols mixed with certain essences, such as vermouth, bitters, curaçoa, black-currant, ratafia, "cassis," liqueurs, and Spanish wines. These are the drinks preferred by the wives of working men, clerks, artisans, well-to-do peasants, in a word by the aristocracy of the popular feminine tribe.

Laborers' wives who work on our coasts and in factories which employ a great many of them, consume chiefly white wine.

Wound-wort water, a drink prepared from the kidney-vetch, and tafia which is the ardent spirit of molasses, are in vogue among the wives of sailors.

All these liquids have alcohol for a basis, but the works of Magnan and of Motet show the necessity of bearing in mind, while studying the form of intoxication now under consideration, the special nature of the various essential oils, whether combined with the alcohol, or only accompanying it according to its origin ; and I am happy to state that recent studies have been undertaken with this aim in view, and that these studies already justify, in a precise manner, the differential and distinctive characters of the form of intoxication produced by the various bitters, amer picon, absinthe, etc. I believe it necessary to draw the special attention of my colleagues to the effects produced by the habitual use of vermouth. This drink, which enters into the category of wines rather than of alcohols, is particularly detrimental because of the considerable quantity of santonine which it always contains. Vermouth is manufactured by macerating in white wine the terminal twigs of various species of wormwood, or wormseed which is the same thing.

Professor Felix Fraiche has made an analysis of two different qualities of vermouth, that of "superior vermouth," and "common vermouth," and he obtained characteristic reactions of santonine; the liquid, on the addition of potassa, precipitates the per-salts of iron in brown, and gives a white precipitate of the salts of silver and mercury; superior vermouth shows only a stronger proportion of tannin.

If now the effects produced by santonine be studied, one is struck with their similarity to certain characteristics of alcoholism: dimness of vision, twitching of the eyelids, cramps

in the abdomen, spasmodic cough, troubled sleep, and, if a larger dose be administered, general convulsions; now, inebriety produced by vermouth often manifests itself by epileptiform convulsions.

Finally, all statistics show that the marked increase in alcoholism dates from the time when the use of the various manufactured liquors was commenced, and that alcoholism, at least in the chronic form, was hardly known by our fathers, who, it must be acknowledged, used nothing but wines and the alcohols derived from them, and these in moderation.

CHAPTER II.

NOSOGRAPHY OF SUBACUTE ALCOHOLISM.

Organs of Digestion.—The unfortunate victims of alcoholism eat little and digest with difficulty. Pork, preserved fish, cheese, form the staple articles of their diet; being lazy and idle, they do not take the trouble of preparing for themselves wholesome articles of food; moreover, they prefer that which, in their habitual state for want of appetite, plays the rôle of solid aperients. As a consequence functional troubles dominate, and dyspepsia is most frequently observed. The capricious appetite soon be comes irregular and is ultimately lost. Gases develop in the stomach, distend it, and give rise to a tympanitic state which is often great. Sometimes the patient experiences some twitchings, smarting, and finally she avows that she is troubled with the one characteristic phenomenon, pyrosis in the morning.

Enteralgia is also frequently observed, and is characterized by a violent pain referable to some part of the abdomen, which is diminished by pressure. A great deal of flatulence accompanies this condition and gives rise to nausea, cold sweats, sometimes also vomiting. The attack terminates by a large evacuation of gas.

When alcoholism becomes chronic in women, they present the same symptoms as men do (acute, ulcerous, or chronic gastritis), but these symptoms very rarely manifest themselves in women attacked by subacute alcoholism.

It is generally admitted that, of all the abdominal viscera, the liver succumbs most easily to the influence of alcohol, and that steatosis and cirrhosis are the two pathological conditions most frequently observed in drunkards. In subacute alcoholism jaundice is frequently met with. It does not appear until the disease is pretty far advanced, and is preceded by symptoms referable to the stomach and intestines which have just been described.

The adipose tissue of the mesentery is increased in quantity. A certain degree of alcoholism rather favors the plumpness of young women; either because the alcohol stimulates the activity of the cells, or, being totally eliminated, it merely retards disassimilation.

We have demonstrated that among the pathological conditions following the use of alcohol should be reckoned peritonitis, which is equally frequent in both sexes. In one of Dr. Lancereaux's cases, a young woman presented herself in 1861 at the consultation with an enormous abdominal swelling; she was obliged to loosen her chemise and to hold up her petticoat behind, not being able to bear the pressure of the tapes. On strongly palpating the abdomen without eliciting any signs of pain, we were far from suspecting peritonitis. This woman died the following day, and at the post-mortem we found organized and resistant false membranes, inclosing between them a yellow serous liquid. These membranes covered the entire peritoneal surface and caused the abdominal viscera to adhere firmly to one another.

Respiratory Organs.—The alteration of the voice, in consequence of a laryngo-bronchitis, is characteristic of subacute alcoholism in women. The alcoholic voice is more frequent in women than in men. It is due to an alteration of the laryngeal mucous membrane which frequently extends to that of the bronchial tubes, hence the dyspnœa and fits of coughing. Pulmonary congestion and acute pneumonia are often caused in women by alcoholism. We have thrice met with the pulmonary indurations described by Magnus Huss, analogous to those met with in hepatic cirrhosis. According to this author, alcohol is capable of arresting the tubercular dyscrasia; we have observed, on the contrary, that in alcoholic prostitutes miliary tuberculization makes exceedingly rapid progress; as Dr. Lancereaux has shown, alcoholic drinks here play the rôle of an irritant to the walls of the capillary blood-vessels and to the terminal branches of the bronchial tubes. At all stages, moreover, alcoholism is a powerful excitant of diseases of the respiratory organs.

Circulatory Organs.—We have sometimes met with the adhesive form of pericarditis, and have recognized a yellow coloration, softening, and friability of the muscular tissue of the heart.

The aorta and especially the pulmonary artery, as Dr. Lancereaux has so well shown in chronic alcoholism, are often the seat of lesions connected with subacute alcoholism. These various lesions are difficult to recognize during life, but we have, nevertheless, suspected them in certain cases.

Urinary Organs.—Nephritis is frequently met with in subacute alcoholism; albuminuria, when it is present, is most often of short duration; chronic urethritis is also frequently met with in drunkards, in whom it is very difficult to cure.

Brain and Nerves.—All authors have described numerous lesions of the cerebrum, cerebellum, and of the meninges in acute, but especially in chronic alcoholism. In female victims of subacute alcoholism, the functional disorders which are associated with these lesions are important to know. In all inebriates, the affections of the nervous system, whatever form they may present—general paralysis, dementia, chorea, epilepsy, mania—exhibit special symptoms of alcoholism in addition to the pathognomonic symptoms of these conditions. We have often had the care of hysterical patients who drank to excess, and we have also seen hysteria develop in young alcoholic women. As to the diagnosis of alcoholism, Dr. Lancereaux truly says that the varied manifestations of hysteria often exhibit some resemblance to chronic alcoholism, but he adds that hysteria is a disease peculiar to young girls, while chronic alcoholism is only met with at an advanced age, and nearly always in men.

Let us recapitulate the nervous disorders, recognized by all authors, in chronic alcoholism, and let us seek for the relations that may exist between these disorders and hysteria.

a. Locomotor troubles. There is, first, convulsive twiching of certain parts, known as "the shakes," spasms, subsultus tendinum, cramps, convulsive fits resembling chorea, and epilepsy; if the patient continues to drink, then muscular weakness appears, especially of the upper limbs. Then there is paresis rather than paralysis.

b. Sensory troubles. Giddiness, insomnia, nightmare, frightful visions. Hyperæsthesia of the skin, or of the deep parts, at the beginning of chronic alcoholism; at a more advanced stage, anæsthesia.

c. The special senses, sight, hearing, touch, are always more or less affected.

As to hysteria, its principal symptoms are: 1, an excessive sensitiveness; 2, hyperæsthesia of the skin, which may be general, or unilateral, or circumscribed, especially on the left side; 3, hyperæsthesia of the muscles; 4, hyperæsthesia of the nerves and of the viscera. Hysteralgia is rare in the body of the uterus, it is more frequent at the cervix in the shape of an extremely painful spot, usually situated on the left side. 5, Analgesia and anæsthesia; 6, loss of consciousness of muscular contraction; 7, convulsions; 8, excessive excitability of the genital organs. The latter is a cause of hysteria (prostitutes, women of easy morals, domestics), it is also the consequence of alcoholism, and honest women who love to get tipsy speedily experience sexual desires of a violent nature, and become ultimately hysterical.

We believe that hysterical patients are naturally prone to become alcoholic, and that alcoholic women, reciprocally, become hysterical, provided a predisposition to that affection exists in them.

Genital Organs.—Dr. A. Fournier, in his article on Alcoholism, mentions the frequency of menstrual troubles and metrorhagia in women addicted to drunkenness. Dr. Lancereaux says that menstrual troubles and the cessation of menstruation are phenomena which are frequently observed in female victims of chronic alcoholism; he adds that he has been struck several times by the frequency of abortion in women addicted to drunkenness. For our part we have not met with any menstrual troubles in alcoholic women to a greater extent than in the average patient; and as to abortions, they are extremely frequent at Lorient, very rare in the suburbs, and are nearly always due to syphilis.

According to Dr. Casanova, the sexual desire is diminished and indeed abolished in alcoholic patients, and this phenomenon appears to be more marked and more frequent in patients intoxicated by alcohol mixed with the essential oils. We admit to a certain extent the truth of this observation as to men, and as to all cases of chronic alcoholism in either sex; but we have endeavored to verify this in female patients affected with subacute alcoholism, and we can affirm that no country produces more children than Brittany.

To what cause then do physicians, in establishing a diminution in the birth-rate of a country, attribute this phe-

nomenon? To the general alteration of the nervous system, and to a defective tone of the tissues. Now, the alteration of the nervous system in female subjects of subacute alcoholism is rather an excitation, accompanied by a diminution or total loss of shame.

Finally, the tonicity of the tissues, so indispensable to man, plays no rôle in woman, conception being as frequent as in the normal state, and intercourse more so.

Unless alcoholic women abort during the first months of pregnancy, gestation goes on to full term. Premature births are not more frequent, and the mechanism of labor is normal.

As to the sequelæ after delivery, we have seen some grave complications due to lesions of alcoholic origin.

Diagnosis of Subacute Alcoholism.—In women the diagnosis is sometimes difficult to arrive at. We believe we are right in adopting the very ingenious classification of Professors Lassègue and Ball.

In some women, alcohol acts by preference on the viscera (stomach, liver, respiratory and circulatory organs). These are strong-minded women, those who can with impunity, and at certain times, give way to their passions; they do not "run off the track" easily. Others, whose characters are less strong and whose central and peripheral nervous systems are more specially altered, do not easily withstand temptation and become readily intoxicated.

The former class, the strong-minded women, are especially prone to digestive disorders, dyspepsia holding the first place; and when in presence of a woman in these conditions, one is tempted to diagnose at the beginning of the disease, and even for a long time afterward, an essentially nervous affection of the stomach. Very often the diagnosis is rendered easy by the confessions of the husband or by revelations from confiding friends and neighbors. The physician is enlightened if he ascertains that the patient suffers from pyrosis in the morning, and a subicteric tinge of the skin. Dyspnœa, palpitation, breathlessness, without any important lesion of the heart or lungs, may also put the physician on the right track.

In women of weaker mind, the character changes, they become sullen, taciturn sometimes; very often, on the other hand, they have expansive and even compromising ideas; occasionally these two phenomena alternate.

The phenomena presented by the strong-minded women may also be confounded with those of anæmia and chlorosis, so much more easily if hæmic murmurs are heard either over the heart or carotids. The weak-minded women are also often pronounced to be cases of ordinary hysteria, owing to the numerous troubles of the nervous system and of erotic ideas, and the physician never dreams of connecting these symptoms with subacute alcoholism.

The differential diagnosis from chronic alcoholism is likewise difficult to establish; the following, however, afford some characteristics:

History.—Chronic alcoholic patients are most frequently daughters of drunken parents, or wives of drunkards. Victims of subacute alcoholism belong most often to families in which sobriety is observed.

Manner of Onset.—Subacute alcoholism is sometimes completely evolved after a slight intoxication; in these cases the early symptoms are less insidious than in those of chronic alcoholism. Very frequently it is accompanied by a radical change in the patient's manner of life.

Symptoms.—As we have already said, only functional troubles are observed in subacute alcoholism, without any appreciable organic lesion, which, however, always exist in chronic and even in acute alcoholism, and are besides accompanied by a stupid demeanor, never present in the subacute form.

Prognosis.—The prognosis in subacute alcoholism is less grave than in the two other forms, especially if the cause of the affection be recognized at the beginning.

Progress.—Sometimes by drugs, but especially by moral treatment, the progress of the disease is arrested; but most frequently the physician finds himself powerless and the woman gradually advances toward chronic alcoholism.

The Nature of the Liquors.—The so-called sweet liqueurs (curaçoa, anisette, vermouth, Spanish wine), which in themselves do not cause intoxication, but join to the evil effects of alcohol those of the essential oils and of the alkaloids which they contain, predispose to the subacute form; the chronic form being met with rather in those who drink strong liquor in various forms (rum, tafia, cognac).

Treatment.—Marriage often modifies this lamentable habit in young girls. In young wives, lactation, confinement in

houses of refuge, sojourn in families in which there is a constant supervision of the habits of the patient, these have led sometimes to definite changes in the habits, and as a consequence to the restored health of the patient. Amylic alcohol, an empyreumatic oil prepared by distillation from the solanaceæ and present in considerable quantity of potato brandy, has been employed by Magnus Huss as a corrective in alcoholism; we have tried it with some degree of success and administered it in pill form.

Conclusions.—1. The abuse of alcoholic drinks is as frequent—at least in Brittany—in women as in men.

2. By reason of the quantity, of the quality, of the manner in which it is taken, and of the nervous temperament of women, alcohol produces in them a subacute form which is rare in men.

3. The symptoms presented by the nervous system assume a special form; melancholy being replaced by a permanent state of excitement.

4. The generative functions are not depressed as in men; conception is easy, pregnancy without accidents.

5. The offspring from an alcoholic mother is more healthy than one from an alcoholic father.

During twenty-five years we have collected at the hospital, and in consultation, about 300 cases of alcoholism as a basis for our thesis. It appears to us sufficient to choose from this number certain cases of subacute alcoholism with functional disturbances of the viscera (strong-minded women), and an equal number of cases presenting disturbances of the nervous system (women of feeble mind).

As we have had the means of following up these cases a long time after they had first shown symptoms of intoxication, we have been able to collect a large number of examples of chronic alcoholism following on the subacute form; of these we give a few examples:

CASE I.—A. G., aged 38, excellent constitution. Menstruated at 14. Alcoholic excess at 20; increase of the habit with age. Had two natural children quite healthy. At first consultation found digestive disturbances of a diverse nature, want of appetite, morning vomiting, enlarged liver. Palpitation on the slightest exertion; cephalæmia, insomnia, muscular trem-

ors of arms and face. Constant sexual desire impossible to satisfy. Masturbation unrestrained. Nymphomania ceded to bromide of potassium, but the alcoholic excesses continued. She came back again. Patient became very obese. This is a case of subacute alcoholism, due to various mixed drinks, in a strong-minded woman.

CASE II.—J. de M., well-characterized dyspepsia. Abandoned husband and both children. Soon suffered from insomnia, frightful hallucinations, and symptoms of delirium tremens. Left hospital saying she was going back to her husband, but in reality became a member of a band of public girls, and again commenced to drink. Became pregnant and was confined at maternity of a child she was able to nurse. Having left the hospital, she recommenced the same kind of life and her child died of starvation. Case of subacute alcoholism due to tafia.

CASE III.—Br——, aged 19, daughter of a confirmed drunkard; sexual desires going to nymphomania; mother, a chronic alcoholic, has the same tendencies. Came to hospital because of syphilis and digestive disturbances. Case of subacute permanent alcoholism. In another similar case the parents married their daughter at 15 because of excessive sexual desires; she had eight children, but continued an idle, disreputable life. This case was successfully treated by the empyreumatic oil of potatoes.

CASE IV.—Widow S——, aged 33, dressmaker; no serious disease previously; entered hospital May 1st, 1886; widow in 1885. Drank a glass of vermouth or wormwood water since childhood. She frequented balls, and again married, this time a sailor who was frequently absent and by whom she had three children. Drank during each pregnancy without any symptoms save a little excitement. At the death of her second husband she drank still more without becoming inebriated, and again entered the hospital for disturbances of digestion. Pyrosis in the morning, excessive hepatic and abdominal pain, yellow coloration of the skin; sexual desires treated by purgatives and bicarbonate of soda. She left in a satisfactory state and continued her old habits with a newly-found lover. Case of subacute alcoholism. Vermouth, wormwood water, etc.

Second Class of Women (weak-minded Women).—

CASE V.—D——, aged 30, menstruated at 13, no previous dis-

ease; 4 children; 2 abortions. Entered the hospital in 1886 for first attack of mania which lasted a month, followed by a period of depression. Recommenced household duties and became pregnant. Pregnancy and parturition normal excepting a post-partum hemorrhage; lactation abundant, during which a second attack of mania declared itself; she was taken to the asylum, where she was confined for six weeks. A long time ago this woman commenced to drink and now presents all the symptoms of alcoholism, insomnia, nightmare, melancholy, hallucinations, delirium; then quite suddenly she was seized with congestive mania, became furious and dangerous even to her children. Since her widowhood, in 1887, the state of depression has been replaced by excitement; but sexual sensations were always exaggerated and finally she became a prostitute, and now, although young, she is demented. Case of hysteria, acute mania, from cognac, tafia.

CASE VI.—G——, aged 33, drunken habits since 17; no venereal disease. At the age of 32 abandoned her life of prostitution and lived as wife with a porter. Became pregnant, which state she bore well, still continuing to drink. Entered the maternity for confinement expected at the end of July. At the beginning of that month she was attacked by cerebral apoplexy characterized by sudden loss of consciousness, deviation of the right facial muscles. Right hemiplegia, involuntary passage of urine and fæces. No amelioration during several days. July 20th parturition commenced, but being completely paralyzed in the right side, and the fœtal head being in the fourth position at the pelvic inlet, we used the forceps and delivered a living child which was greatly congested and died an hour afterward. The third stage of labor was completed naturally. Hemiplegia persists, but speech and intelligence partially return. Some months afterward the patient was able to commence the occupation of rag-picking. Once more became pregnant, and again entered maternity for confinement. She bore pregnancy well, but loss of speech and hemiplegia remained. The inert state of the uterus again compelled us to use the forceps; child at full term, well formed, but died an hour afterward. The patient left the hospital at the end of fifteen days, recommenced her habits of drunkenness, but presents only some impediment of speech and an uncertain gait. Subacute alcoholism. Tafia, cognac.

THE DIFFERENT METHODS

OF

LIFTING AND CARRYING THE SICK AND INJURED.

BY

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TRANSPORT OF THE SICK AND INJURED.

CHAPTER I.

INTRODUCTORY.

It is not many years ago, that the provision for help to the accidentally injured, in our own city streets, was left to the uninstructed and haphazard generosity of chance passers by. I have known a man severely injured, by a street accident, to be left lying nearly one hour in the midst of the roadway through a densely populated district in which the accident took place, waiting in the first place for a policeman, and next, while the policeman, after he had been found, went to the distant police office and returned with a stretcher and assistance to remove the injured man to the hospital. Nor was that the worst of the matter, for the assistance when obtained was unskilled, and it not unfrequently happened that in ignorant zeal, while endeavoring so far as they knew, to help the wounded, often really greatly aggravated his injuries. A story is told of a great surgeon of the last generation who had the misfortune one frosty morning to slip down, while on his way to hospital duties, and break his leg. The people around flocked to him and would have lifted him up, but he struck at them so savagely with his stick that they were obliged to leave him untouched, until he could tell them his name and send a messenger to the hospital for a stretcher and skilled help. Now what was the reason of this conduct? The surgeon knew by long experience the danger of such well-meaning but uninstructed interference; he had seen hundreds of what had been in the first instance cases of simple fracture

of the leg, needing only a short period of rest and immobility in properly applied splints for complete recovery, turned in an instant, by unhappy though well-meant attempts at removal, into severe and, in those days, long-continued cases of compound fracture, the ends of the broken bone protruding through the rent skin and torn muscles, and open to all the evils which we now know to be carried about by the air of our crowded cities. It was a wise, though to the people so brusquely repelled, it must have seemed an ungrateful act. But nowadays, thanks to ambulance lectures, the efforts of the St. John Ambulance Association, of volunteer ambulance corps, of teaching of policemen, workers in mines and machinery, and the general popularizing of this subject, we are on the way to better things; and it is with the hope of assisting the people to reach that end that I have endeavored, in the remarks to follow, to place before, primarily my own men of the medical staff, and secondarily, those of the bodies before mentioned and the general public, that I have undertaken this task.

It is not an uncommon state of mind among the students of an ambulance or "first aid" class, to think that when a pad has been well and accurately placed upon a wounded artery, or some cleverly improvised splints adjusted to a broken limb, or some other injury neatly bandaged, the work is finished. This is not so; sometimes and by no means infrequently it will happen that the most difficult part of the task has yet to be done, and that is to discover how best to remove the injured person. The varying circumstances under which injuries are received, or illness may occur, make this an extremely important consideration, and one of even greater importance and complexity in civil than in military life.

On the field of battle, on the parade ground, in the camp or in barracks, there is plenty of scope and room, ready assistance, skilled and trained bearers, stretchers, light, space, and air; in the dark passages of coal or metal mines, in the narrow passages, between whirling wheels that carry death and mutilation in their revolutions, in the heat, glare, and distraction of the foundry or the mill, there are none of these things, and the man who desires to be of service to his fellows in their direst hour of agony, must have clear wits and intelligence of no mean order to choose on the spur of the moment,

amid the distractions of horror, and perhaps fear for his own safety, the best and most feasible of the measures practicable under the circumstances of the case. These circumstances will be varied by the cause of injury, as, for instance, the case of injury inflicted by a fall of roof in a mine, when it may be impossible for more than one person to get near enough to the patient to afford any assistance, or a person unconscious from choke-damp or the inhalation of other noxious gases; or of smoke, as in a burning house—in such cases it would be unwise to expose more men than are absolutely necessary for the purpose of rescue, to such imminent danger, and the great object is the instant removal of both the unconscious patient and the yet conscious rescuer from the noxious influence. In such cases as these the mode of removal becomes quite secondary to the imperative necessity for the immediate performance of the act, but in other cases, as, for instance, severe machinery accidents, it will often be requisite to perform some of the acts necessary for the arrest of bleeding, or for the rendering immobile the extremities of fractured bones, before proceeding to removal. In the latter case (that of fractured bones) or when the patient is unconscious from whatever cause, he should be placed upon a stretcher of some kind, whenever it is practicable; but it will occasionally happen that, from the peculiar circumstances of the case, the urgency of removal is so great that, even in these cases, the risks of increasing the injury become less than the risk of leaving the injured person in the position in which he is found. Of this kind are injuries on the field of battle under heavy fire, in dangerous parts of mines, when there is impending danger of fresh falls of roof, or of choke-damp after explosions, injuries in the roadway of crowded thoroughfares, in cities not yet provided with effective or sufficient ambulance service, and in many other positions, which will at once occur to the thoughtful mind. In all these cases, however, the distance to which the patient is removed should be the shortest possible, no further than to bring him within reach of the proper means and appliances, and out of reach of immediate danger. The days are past when unfortunate wretches with broken limbs, or bleeding vessels, were tortured in jolting carts, or those fainting from shock or loss of blood were propped up in shaking rattletraps, called cabs, for perhaps miles, and there are

but few districts where there will not be found some one capable of applying a first aid dressing to arrest dangerous hemorrhage, and to keep broken bones from piercing through the soft parts of a limb, and of devising some mode of improvising a stretcher, or a sling by which the necessary removal may be effected without thereby aggravating the original injury.

Up to the present, even our best surgical text-books, admirable in most respects as they are, have not given even the slightest space to this very important subject; they are most minute and careful in their description of the details of the application of dressings, and of the treatment of the injuries themselves, but there is scarcely a word or a hint as to the methods of removing, or the best modes of lifting and carrying the sick and injured.

To provide some instructions as to the best modes of doing these things, and to place clearly before my readers the principles upon which the value and practical use of these appliances depend, and at the same time to furnish a few hints which may lead to some fruit in emergencies when the means of conveyance are absent or insufficient, by opening their minds to the possibilities of contrivances for improvising substitutes from whatever means may be at hand, are the objects at which I aim, and the attainment of which will, by affording relief to suffering in the hour of greatest need, and of satisfaction and self-approval in the minds of those so enabled to be of use to their fellow-creatures, be to me its own and a "sufficiently great reward."

CHAPTER II.

ON MODES OF IMMEDIATE REMOVAL WITHOUT STRETCHERS OR OTHER APPLIANCES.

THE first part of our subject is necessarily the most simple and the most urgent. It may arise in civil life, at any moment. A policeman on his beat finds a man lying unconscious in the street. The cause of that condition does not concern us here; it may be drink, it may be apoplexy, or it may be injury; the necessity is speedy removal for safety and examination. A man falls down suddenly in the midst of a crowded thoroughfare on a hot summer day; a fireman on duty in a burning building finds the body of some person lying on the floor of a room filled with smoke; a party of colliers hastening to the mouth of the shaft after an explosion in some part of the mine, find one or more of their number falling to the ground, when to leave them is certain death. All these and a hundred other cases in civil life call for immediate removal, and in military contingencies these conditions are continually happening when the fire is heavy and close. Let us take the first case as an illustration. A policeman, say on a night beat, finds a man lying unconscious in the road. It is not his duty to diagnose the cause of this condition, further than a cursory observation to see whether there are any wounds about him, especially about the head, and whether there are any signs of struggling, or suspicion of robbery or violence; the next thing to be done is to remove him from a place where he is in danger of sustaining further injury to one when he can be examined by responsible and competent authority. For this purpose he takes a position on the right of the unconscious man, turns him over on his face (taking care to put something under the head, so that the breathing shall not be interrupted), and extends his arms in a line with his body. Then lifting him up into a kneeling position, he pushes his right shoulder under the unconscious man's chest, places his right arm over the

thighs and round the right leg, and at the same time, with his left hand grasps the man's left wrist and draws it across his (the bearer's) own chest, finally catching it with the right hand and so holding it. (See Fig. 1.) In this way one arm of the bearer is left free, and with a little practice, an ordinary man is easily carried. It is evident here, that this mode of carrying may, if it be for any reason necessary, be reversed; that is, supposing the case of a soldier under fire, who has been wounded in the right thigh. In such a case the bearer

FIG. 1.—Carrying Unconscious Man.

would, of course, get to the opposite side of the patient, and place his left arm round the left leg, and seize the right wrist with his right hand, finally transferring it to the left. I have known the case of an officer, who was carried for half a mile in this way, after he had been shot through the body and had his ankle shattered by a slug, in the Maori wars, and eventually recovered.

If the patient be a child, a woman, or a slightly made adult, and the bearer be strong enough, he or she may be carried in the arms as in Fig. 2. This mode of carriage is, how-

ever, neither as convenient nor so easy to the bearer as the one previously described, as the body of the patient is in front of the bearer and in his way in descending a ladder, for instance, as from a burning house, and increases the danger of slipping.

If the patient is conscious and not too severely injured to be able to render some slight assistance to his bearer, he may be carried pick-a-back (see Fig. 3), clinging with one or both arms to the neck of the bearer, or if the injury be but slight,

FIG. 2.—Carrying Unconscious Man.

FIG. 3.—Carrying Unconscious Man.

it may be sufficient to place one's self by his side, hip to hip, the bearer's arm round the injured man's waist and the patient's arm round the bearer's neck.

When there are two bearers, the removal of the patient becomes a task much easier of fulfilment, especially if we have the proper appliances at hand, but in the cases we are now dealing with it is taken for granted that there are no such means of carriage within immediate reach, and the necessity for speedy removal is, from some of the causes previously mentioned, urgent. If the patient be unconscious, he may be carried:

a. By the bearers grasping hands—two under his buttocks and two under his shoulders—or

b. If from the position the bearers can only get to one side of the injured man, one will place one arm under his neck and the other under the back, while the second will place his arms, one under the buttocks and the other under the thighs.

c. There is a third but the most clumsy and unsafe of the modes we are describing, and it should not be used unless from some peculiarity of circumstances or position it cannot be avoided. It consists in one bearer grasping the shoulders of the injured man and the other taking his legs, and it will be evident that there are circumstances in which it may be compulsory to adopt it, as in a narrow passage in a mine, or between machinery, when it is impossible to get to the side of the patient.

If the patient be conscious he may be carried by means of an improvised seat, of which there are several varieties, and of which we shall treat in the next chapter.

There is one caution which it is perhaps scarcely necessary to mention in these days of general intelligence and widely-spread information, and yet it would be a defect to omit to give it in a work devoted to the teaching of this subject. It is that a patient shall never be carried face downward: sudden death has not infrequently ensued when carrying men in that position known to soldiers as the "Frog's March."

CHAPTER III.

IMPROVISED SEATS.

THESE modes of removal are of great value, in cases where the injury is not extremely severe, and the patient is conscious; when there is a condition of shock, fainting, severe hemorrhage, and insensibility, some of the other modes by

FIG. 4.—The Two-handed Seat.

which he may be carried in a horizontal position should be adopted. But in suitable cases, and in the absence of stretchers and other appliances for the aid of the wounded, one of the following modes of forming these seats can be used.

1. The two-handed seat (see Fig. 4) is formed by two bearers facing each other, and locking together the hands which are most to the front, upon which the patient is seated, and

the other pair of hands are passed behind the patient to each opposite bearer's shoulder. If the patient be weak and feel faint he can, in this way, by slightly raising one pair of arms and lowering the other, be carried in a position very nearly approaching the horizontal, a very valuable and important practical point in many cases.

It is to be noted that in the valuable work on "First Aid to the Injured," issued by the St. John Ambulance Association, a sketch of this form of improvised seat is given, in

FIG. 5.—The Three-handed Seat.

which the bearers are represented with the hands forming the seat clasped with palms uppermost. This is a defect in an otherwise admirable publication, for practical experience teaches that in this posture the hands of the bearers become speedily tired and cramped, and if the distance to which the patient has to be removed be anything but short, he will have to be put down, to allow them to recover, a thing to be strictly avoided in all cases of carrying or lifting the sick or injured. In all these forms of improvised seats, then, be it remembered, that the knuckles should be uppermost of the hands which

bear the weight and strain. This form of seat is also valuable in cases when the arms have been so injured as to preclude the patient from rendering any assistance to his bearers. It is also frequently used to lift a helpless patient from a chair to his bed, and then used in this way. A bearer stands on each side of the patient, and passing one arm under his knees, clasps the hand of the other; both bearers then pass their arms round the back of the patient and grasp each other's shoulders, and so proceed to lift.

FIG. 6.—The Four-handed Seat.

2. The three-handed seat (see Fig. 5). This form of seat is, in my own experience, the most generally useful of the three forms, and provides both a good firm seat and a support for the back. It is also especially applicable to the case of a person of short stature, a youth or a child.

The three-handed seat is thus made. The two bearers stand facing each other as in making the two-handed seat; but in this case, one bearer holding up his own left arm grasps the thick portion of the forearm, just below the bend of the elbow, with his right hand, the knuckles being uppermost. The

other bearer then grasps the thick part of the first man's right forearm just below the elbow, with his knuckles uppermost. At the same time the first man grasps the thick part of the second bearer's left forearm, and thus forms a triangular seat, while the second man passes his disengaged arm (the left) round the back of the patient and seizes the shoulder of the other bearer. This seat is especially advised to be used when the patient feels faint and needs a good firm seat and also some support for the back.

In cases where the patient is able to render some slight assistance, and is not at all faint, we may use the

3. Four-handed seat (see Fig. 6). This seat is firm and well adapted for cases when the distance over which the patient must be carried is considerable. It is formed by the two bearers standing opposite each other and then each grasping the forearm of the man opposite with the disengaged hand. The injured man assists by placing one arm round the neck of each bearer. It is important to remember that in all these cases the knuckles are to be kept uppermost, and it will be seen that each man mutually supports and is supported by his fellow.

CHAPTER IV.

STRETCHERS AND HOW TO CARRY THEM.

Of stretchers there are many forms, and few of them are without faults, but there are two special types which have been approved by government, and which are used in military service. The old pattern known as Mark I., and two new patterns devised by Surgeon-Major Faris, known as Mark IV. and

Fig. 7.—Field Stretcher Mark I. (The slings have recently been fitted with transverse straps.)

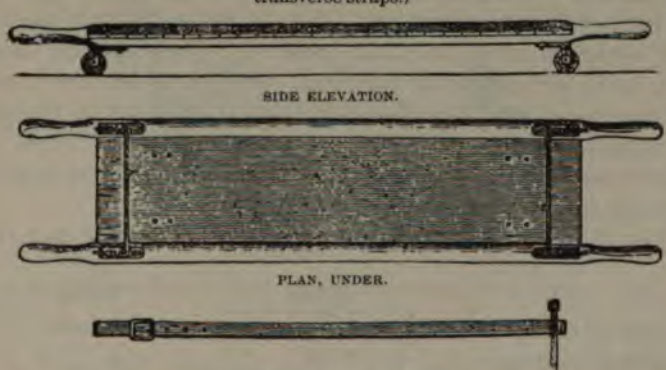

Fig. 8.—Field Stretcher, Mark V., or Faris's. (From Manual of Medical Staff Corps, 1885.

V., which so closely resemble each other that for all practical purposes they may be regarded as one and the same.

There is also the "Furley pattern stretcher," in use by the police, which is a very good, strong, and useful one, provided with straps for slinging from the shoulders. These stretchers

are in very general use in civil life, and besides their cheapness and portability, possess the great advantage of having no independent or separate detached parts to be found wanting when most urgently required.

All these stretchers consist of the following parts: Two poles, two iron rods, or "traverses," to keep the poles apart and at their proper distance, a canvas bottom and a pillow. The traverses are in the Mark I. stretcher simple iron rods fixed to one of the poles at one end by a staple, and bent at right angles at the other extremity to fit into a hole in the opposite pole, about seven inches from its extremity. In Mark IV. and V. the traverses are jointed, and the under part of the poles are fitted with four rackets, carrying three-inch wooden rollers—a very great and important addition, facilitating very much the placing of the stretcher and its burden in an ambulance or other vehicle, and saving much pain and jarring to the wounded, and much labor to the bearers. In the Mark I. pattern the poles are round; in Marks IV. and V. they are square, thicker and stronger. In the former pattern the poles are slipped into plaits made at each side of the canvas; in the latter, the canvas is tanned and nailed to the poles through an edging of leather with brass nails. The pillow in the former case is round, and made of horse-hair; in the latter it is wedge-shaped, varying from 3½ inches at the thickest part to 1½ inches in the thinnest. Eyelet holes are made in the canvas of the stretcher for the attachment of the pillow by means of strings. The shoulder-straps are fitted with transverse bands, which serve the purpose of confining the package formed by the stretcher folded up.

The dimensions of the foregoing stretchers are as follows:

	Mark I.	Mark IV. & IV.
Length of pole, . .	8 feet 1½ inches.	7 feet 9 inches.
Length of canvas, .	6 " 8 "	6 " 0 "
Width, total, . .	2 " 2 "	1 " 11 "
Height, . . .	1½ "	5⅞ "
Weight, . . .	16 pounds.	32 pounds.
Tonnage, . . .	—	.08 ton.

There is also a very admirable invention, patented by Mr. John Furley, Hon. Director of Stores to the St. John Ambu-

lance Association, which may be described here. It is called the "Ashford Litter," and consists of a folding-stretcher, one extremity of which is so raised as to form an automatic pillow, and provided with a removable cover.

This stretcher is carried upon an under-carriage of two wheels, on elliptical springs, and so arranged by means of crank-shaped axles, that the bearers can pass between the

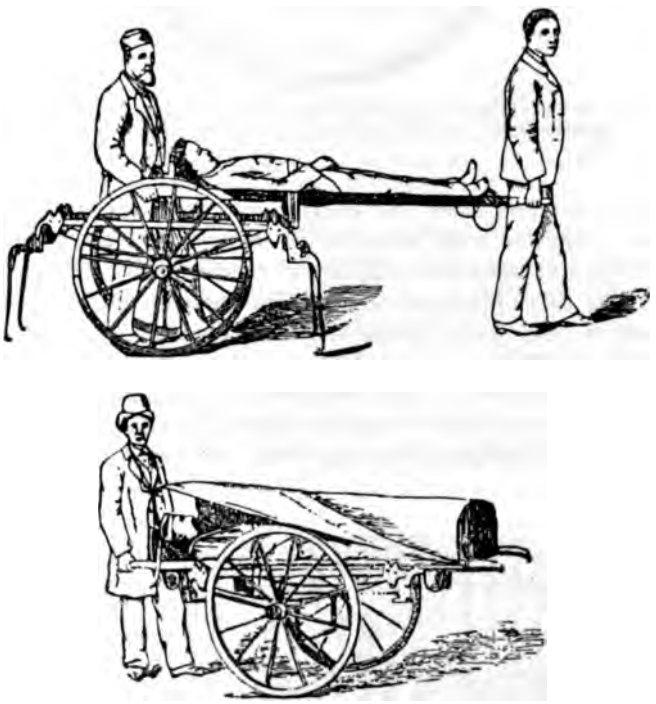

FIG. 9.—(Patented by Mr. John Furley, Honorable Director of Stores to St. John Ambulance Association.)

wheels with the stretcher, and thus avoid the danger and jolting incurred by lifting the injured person over them. We have described above the chief forms of stretcher used in civil and military life, but it is one of the most valuable qualities of the ambulance student to be always wide-awake to the possibilities of the service, and to constantly exercise himself in devising extemporaneous appliances for the relief and carriage of the helpless, from such things as are nearest at hand.

It may happen even to the best-appointed ambulance on the field of battle that the number of stretchers is insufficient for the conveyance of all the wounded, and then it is that the presence of mind and readiness of adaptation on the part of the bearers are called into requisition. In civil life the emergencies are even more frequently so sudden, and so unexpected

FIG. 10.—Hammock, used during the Ashantee War, Arranged with Shade for Protection from the Sun. (From drawings by Surgeon J. Fleming. From Surgeons Porter and Godwin's book.)

by those around, that the means and appliances are either too far away, or from some other cause not at the moment available, and the same qualities of readiness and resource find their field and opportunity. The hammocks (Fig. 10) used on shipboard are, when available, very comfortable and useful means for conveying wounded, and in these days of tennis courts and luxurious lawn hammocks, the means of forming such conveyances are at hand in most suburban and rural districts. There is the advantage that one strong pole is sufficient for the purpose, though if two can be obtained the sub-

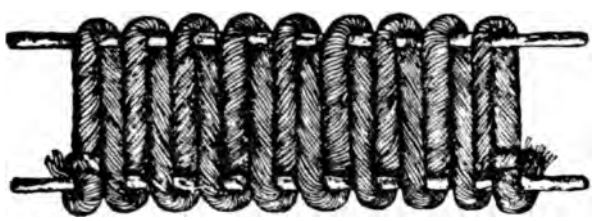

FIG. 11.—Stretcher, Constructed with Hay or Straw Rope. (From Surgeons Porter and Godwin's Surgeon's Pocket Book.)

stitute for a stretcher is more complete. Blankets with a loop sewn in each corner can, with two poles or two rifles, form a temporary stretcher, by folding the blankets in two, so as to bring all the loops to one side. Through these is passed one pole or rifle, and the other is passed between the two sides of the blanket when folded. If no poles are at hand, a patient may be carried in a rug or blanket by four men, one at each

corner. A couple of sacks, always to be found about a farm, and generally about mines, works, and manufactories, cutting holes through the bottoms and passing the poles inside the mouth and through the holes in the bottom of the sacks. The hay bands (Fig. 11), the ropes, the reins or straps of harness

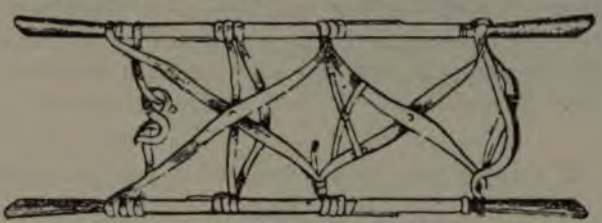

FIG. 12.—Stretcher, Constructed of Four Rifles, with Valise Equipment and Strap. (From Surgeons Porter and Goodwin's Surgeon's Pocket Book.)

in civil life, the straps and belts of soldiers (Fig. 12), and their rifles in military work will all or any of them provide means for making a sort of webbing as a support between two poles, thus providing an improvisation of a stretcher. The garments of the injured man, or his fellows, a couple of coats or vests, or both, turning the sleeves inside out within the garments (See Fig. 13), and buttoning it over the poles or their substitutes; even two or three shirts or a pair of trousers will serve

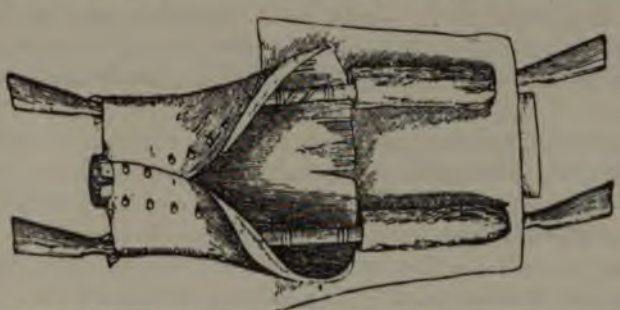

FIG. 13.—Stretcher, Constructed of Four Rifles and Two Coats. (From Surgeons Porter and Godwin's Surgeon's Pocket Book.)

the purpose; or in the field of battle a couple of knapsacks fastened by their straps to a pair of rifles will serve at need. Telegraph wires may also be utilized in the same way, and the cool and thoughtful student will easily extend the list of possible means by intelligent and instructed observation. If the materials at hand are insufficient to form a stretcher in

which a man can lie at full length, or if the injury be such as to allow him to sit up, a short stretcher can be easily improvised, which will furnish a comfortable seat from a coat, or other articles of clothing, and in such a case the patient should sit with his back to the front bearer. It is always advisable to try the strength of an improvised stretcher by one of the bearers himself getting upon it before placing the injured man thereon, for nothing is worse, or more distressing, than to see a stretcher break down under the patient.

How to Carry the Stretcher with the Injured or Sick Man.

I have previously remarked that the rules and methods suitable and well adapted for military exigencies, where there is usually ample space and trained and skilful aid, are not in all cases capable of use or applicable to the circumstances under which accidents occur in civil life. Thus in a sudden emergency the ambulance student, who has been taught and knows his part of the stretcher exercise, as detailed in the military manuals, may suddenly find himself called upon to take charge and direction of the removal of a severely injured person, in a cottage, a manufactory filled with whirring wheels and distracting noises, or in darkness and danger in the narrow passages of a coal or metal mine, with the only assistance of well-meaning but utterly uninstructed fellow-workmen of the victim instead of Numbers 2, 3, and 4, of his stretcher detachment; and in place of the regulation stretcher and the arranged ambulance wagon, an improvised stretcher and a common cart without springs; yet in these cases his training will serve him well, if he but use his knowledge with intelligence, and discarding or altering details to suit the circumstances, bearing clearly in mind the intention and underlying principles which are the raison d'être of these regulations. On this point, the remarks of Professor Sir Thomas Longmore are well worthy of quotation. "The military rules," says the professor, "were framed for service in the open air, where there is of course plenty of space, but all such rules must be modified according to circumstances. It is well, I think, to teach the system which is thought to be best, and at the same time to prepare persons for doing that which is next

best, when what may be best under other conditions ceases to be applicable." Acting in the spirit of these remarks, I will proceed first to recount the official instructions to bearers, and afterward to consider how they may be modified under the pressure of other varying conditions.

The front and rear bearers of a stretcher must start with opposite feet, and must not on any account keep step, thus the front bearer starting with his left foot, the rear man starts with the right, and this "broken step," as it is called, must be kept up throughout.

They must not walk with a springy elastic step while carrying a wounded or sick man, but plant the whole foot firmly and evenly on the ground, and lift it as a whole, something

FIG. 14.

like a flat-footed person would, not using the spring from the toes.

The front and rear bearers must use an exactly equal step (with opposite feet), to avoid an uncomfortable jolt and catching up at intervals, very distressing to the patient.

The bearers must march steadily, and holding the stretcher as low as possible with bent knees (see Fig. 14), take a step of about twenty inches in length. If possible, men of the same height should be chosen as bearers, and those of the same degree of strength, or nearly, will carry more evenly.

On level ground the patient is to be carried feet foremost, and also when going downhill, unless he has a fractured thigh or leg, under which condition he is best carried head foremost to prevent the weight of the body producing pressure upon the broken limb, and so cause distress and probably danger of increasing or complicating the injury. Carrying uphill the conditions are reversed; he is to be carried head first, unless he has a fractured thigh or leg, when for the same reasons as above-mentioned he should be taken feet first.

It is an important thing when slings or shoulder-straps are used, to see they are so fixed as to support both poles of the stretcher at an equal distance from the ground. A stretcher should never (if possibly avoidable) be carried over a hedge or wall, either the bearers should go round until they find a door or gate, or they should make a hole through or pull down part of the wall. Also, it may be well to note that a stretcher should never be carried on the shoulders, as apart from his danger of rolling off in his helplessness, he is beyond the power of observation, and in the field of battle such a misfortune may happen as actually occurred to General Stonewall Jackson, who being wounded and so carried on the shoulders of the bearers, when one of the latter was struck by a shot and fell, precipitating the wounded general to the ground and causing additional injuries, which eventually proved fatal. In crossing a ditch or narrow hollow, the stretcher must first be placed carefully down on the ground, while the first bearer descends into the hollow. He then supports his own end of the stretcher and the other advances it until the back part reaches the bank on the same side of the ditch or hollow, when the second bearer descends. Then the two support and advance the stretcher until the front reaches the brink on the far side of the hollow. Then the front bearer ascends while the rear bearer supports the rear end of the stretcher, and the two lift or push the stretcher far enough to be perfectly safe on the higher ground. Then the rear bearer himself ascends, and the two take up the stretcher again and proceed.

Always bring the stretcher as near to a wounded or sick person as possible. If you have four bearers it should (if circumstances allow) be placed by the side of the patient; if only three or two, then the foot of the stretcher should be placed at the head of the patient in a line with his body. The mode of lifting a patient on to the stretcher will also depend upon the number of bearers available. It is most neatly and satisfactorily done by means of four bearers, who are placed three on one side and one on the other of the patient. The side upon which the three bearers take their stand will be always, of course, the side furthest from the stretcher, and will vary according to circumstances and the nature of the ground. 1st. They should be numbered, 1, 2, 4, 3, No. 4 to be the man

who gives commands, so that all can act together—a matter of great importance to the comfort of the injured. 2d. All kneel on one knee (the left if the stretcher is on the right of the patient, and the right if on the opposite side); No. 1 passes one hand under the armpit of the opposite side of the patient (avoiding any disturbance if the arm be broken) and under the patient's neck, and the other under the shoulder next to him. Nos. 2 and 4, who are on each side of the patient facing each other, pass both arms under the loins and hips, and No. 3 under the legs; or if a leg is broken he holds the broken extremities to prevent movement. If the patient can, he should be told to put his arms round the neck of No. 1. 3d. They all lift at one moment, raise the body of the patient on to their own knees, and support him there while No. 4 now removes his hand and pushes the stretcher under the injured person, who is then (by the help of No. 4) lowered carefully and gently upon it.

If only three bearers are at hand, the stretcher is placed at the head of the patient in a line with his body. Nos. 2 and 3 take position on the right and No. 1 on the left; Nos. 1 and 2 support the shoulders and body of the patient, grasping each other's hands underneath him, and No. 3 takes charge of the lower limbs, and all three lift the patient, and taking short side-long steps advance the length of the stretcher and carefully lower.

In unloading the same movements are used, of course in reversed sequence, and when there are only three or two bearers the patient is carried by side-paces over the head of the stretcher.

CHAPTER V.

THE TRANSPORT OF SICK OR INJURED FOR LONG DISTANCES.

WHEN circumstances necessitate the removal of a number of sick or injured persons for a considerable distance, as after a battle, or a colliery explosion, or any other disaster affecting numerous persons, it will often become necessary to use such means of conveyance as the district affords, either wholly or as supplemental to the approved and perfected ambulance of the service.

If there is no railway conveniently situated, it may be necessary to use the common springless jolting country carts; but these, even if provided with mattresses, or sacks filled with straw, are very distressing to the injured from the constant jarring and shaking to which they are subject. Even if the floor of the cart be well covered with straw or hay, the constant vibration causes it to move and gather into heaps between the bodies of the patients, gradually leaving the helpless sufferer to find the hard boards and agonizing shocks of the rude vehicle.

It is best, if the patient is on a stretcher, to place it, with the patient upon it, in the cart; the floor should be covered to a considerable thickness with hay, straw, sea-weed, shavings, bracken, heather, or other suitable substance.

But far better is it to adopt the mode used by Surgeon-Major C. Smith. In this case one end of a rough pole is lashed to the top side rail of the cart or wagon, outside the side bars; to the front another is similarly lashed to the rear end of the same rail inside. The same is then done with the top side rail of the other side of the cart or wagon. Cross-poles are now lashed to the free ends of the four poles; and these cross-poles support the stretchers containing the wounded, which are firmly lashed thereto.

They thus get the benefit of the spring of the free ends of

the poles, and to keep this within proper limits, bands of twigs or ropes are placed loosely round both poles and top rail of the vehicle.

When a railway is attainable, a single patient not very seriously injured may be well conveyed by placing a board across the seats or using the cushions of the other seats, but if more severely hurt, the stretcher should be suspended in the guard's van, or any sufficiently open carriage, taking care to so lash it to the sides as to prevent too great vibration, or the possibility of its swinging so far as to strike the side of the carriage. Here again the hammocks and netting so common about country houses and lawns can be utilized as modes

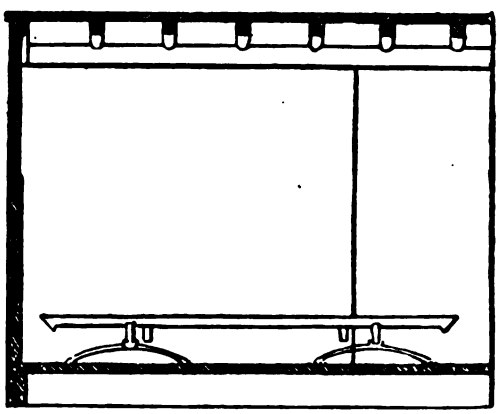

FIG. 15.—Longitudinal Section of Part of a Goods Wagon Fitted on Grund's Plan.

of conveyance, and are very useful and comfortable modes of conveyances if slung from a strong beam, and a support supplied beneath the knees (except of course when there is fracture of the lower limbs not yet reduced), and secured by splints and bandage.

In military practice, the available means of railway conveyance are by second-class carriages and goods wagons; in the former the distance between the seats is too small to allow the full-sized stretcher previously described to be used, and a special wagon stretcher which is described with the Mark I. ambulance wagon (and is shorter than the field stretcher) is used. In these cases two stretchers are placed in each compartment of a second-class carriage.

When goods wagons are available, they, unsuited as they

are in their original state, may be rendered fit for the conveyance of considerable numbers of wounded or sick by two principal methods. First. Grund's mode (see Fig. 15). Four springs are fixed in the floor of the carriage; on these rest two strong poles, and across the poles are placed the stretchers, three to each wagon.

This mode is most suitable when only open lorries are available.

The second, the mode introduced by Major-General Zavodovski (see Fig. 16), is adapted for covered wagons, when a larger number can be conveyed, eight stretchers being the

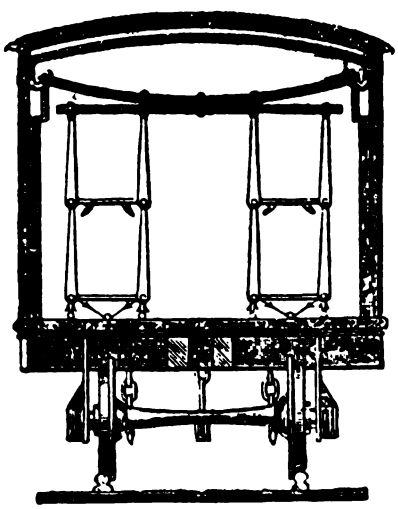

FIG. 16.—Transverse Section of a Goods Wagon Fitted on Zavodovski's Plan.

complement of one wagon. Two stout cables, an inch in thickness, are suspended across the top of the car, fixed to iron hooks that fasten to iron rings 2½ inches below the roof. If hooks and rings are not attainable they may be fixed through four holes bored through the sides of the car. To each of the two ropes is attached, at three points, a pole of some firm and elastic wood, about 8 feet long, 2½ inches thick in the centre, and 1¾ inches at the extremities. To the poles thus placed, horizontally, there are attached on each side four strong cords, with knots so arranged that they may support the stretchers in a level position. In order that when the carriage is in motion the stretchers with the patients may not

sway backward and forward, the lower tier is fastened by 1½ inch ropes to three small iron hooks screwed into the floor.

The more frequent utilization of the hammock for moving invalids has been forcibly advocated by Mr. Richard Davey, of Westminster Hospital, and an admirable arrangement, designed by Dr. J. D. Macdonald, F.R.S., R.N., and called an ambulance lift, on the principle already described, has been much used in the embarkation and disembarkation of sick, and is of value also for land carriage. The broad foot-piece and the support beneath the hams are so adapted that patients with injuries, even to the lower limbs, may, after a properly applied first dressing, be removed by them. Four hammocks can be slung in an English railway luggage van.

It will not be altogether uninteresting to note the modes of transport employed in some of the more recent wars. Horse litters were used in 1862 in the American war. They are copied from the Indian mode of transport, and are well adapted for frontier service; they may be made for one or two horses. In the former one end is supported by the horse or mule, and the other trails on the ground. When two horses are used they must be trained, and one supports each end. General Jackson, in his wars against the Indians, used the skins of oxen, etc., slung on poles or rifles, for the carriage of his wounded. The Austrians have almost a perfect system of ambulance trains, each conveying 100 wounded, beside surgeons, dressers, stores, etc. In Egypt, says Surgeon Dick, M.B., A.M.S., there was no wheeled transport, and sick and wounded were carried on litters, one on each side of a camel; a sort of a cot with a movable hood like that of a perambulator; when the patient could sit up cacolets were used. These are a sort of chair, and were slung one on each side of a camel; both litters and cacolets are made to fold up when not in use. With regard to these latter, Dr. Appia, who has had great experience, says that the cacolet with rests is very rarely of use even in wounds of the trunk or arm, or even of the foot; but that it is quite impracticable in wounds of the abdomen, in fractures of the thigh, and compound fractures of the leg. Here the litter or cacolet bed has rendered excellent service.

Surgeon Dick goes to say that at Suakim the Indian dhoolie was used. This is a light cot swung from a long pole,

and provided with curtains for shade and carried by four bearers, two in front and two behind. It forms a very good and speedy mode of transport.

It is by no means an unnecessary caution in military service to see that the rifles the bearers may use as stretcher-supports shall be unloaded before being put into position. Also those bearers who carry rifles, shall see either that they are unloaded or carefully placed in such a position that they cannot injure the patient should they by any accident explode. On more occasions than one is such an occurrence on record as the fatal shooting of a wounded man by the accidental discharge of the rifle of one of his bearers.

CHAPTER VI.

RAISING AND LIFTING HELPLESS PATIENTS IN AND OUT OF BED.

HAVING at length conveyed our patient in safety to his destination, where, after so many moving adventures, it is to be hoped that he will rest and make a good recovery, it will be well to consider some points of importance with regard to those smaller but still important and frequent movements which are still necessary.

A patient can be lifted by two people joining hands under his shoulders and hips; if there is any injury to a limb the part must be supported and attended to by a third person, who shall firmly grasp and steadily support above and below the seat of injury. It is often necessary to move a patient from one bed to another for one of various purposes. When this is the case in hospital, the beds may be brought close together, and he may be drawn on the under bed clothes across from one bed to the other, but this is only practicable when the beds are readily movable and of equal height. In military hospitals, where Captain Russell's stretcher is provided, a patient may be lifted by two attendants. This stretcher consists of two poles connected by strips of webbing and two cross-bars. To use it one pole is removed, and the other, with webbing attached, is laid by the side of the patient. The looped ends of the webbing are then passed underneath the sick man, and the pole which was previously removed is passed through the loops; the cross-bars are then put into proper position and the stretcher is ready loaded for removal.

A sort of improvised hammock may be made by tying the under-bed clothes (if not sufficiently strong to support the weight, an extra blanket should be placed under the patient, sometimes before the removal is attempted) so as to meet above the body of the patient, and rolling them up until the roll is close to him, when, if firmly grasped by two persons,

he will be readily removed for a short distance. With two poles or even two long broom handles, rolled in a similar manner in the under-bedclothes, one on each side of the patient, an improvised stretcher is formed by which a patient may be removed and carried even a considerable distance by four persons. They should stand two at each side, facing the patient, and grasp the poles surrounded by the bedclothes, with one hand near the extremity, and with the other near the centre; and the patient should be removed feet foremost over the foot of the bed. It should always be remembered that when patients are weak and have been long in bed they are liable to faint when they assume the erect position, and therefore great care is necessary in removing them. In lifting a patient from a bed the width of the bed and the presence or absence of a footboard, and its height will prevent us in civil life from having recourse to these methods. In such a case a patient may be removed by two persons standing side by side, the one placing the arms, one under the shoulders and the other under the middle of the back, while the second puts one arm under the lower part of the back and the other under the knees.

A child, a woman, or a very thin light person may often be lifted by one strong bearer, who should pass his arms well under the patient, and be sure that he has a firm hold and is capable of the task before he begins to lift. One arm then supports the broad of the back just below the shoulders, and the other the two knees; also where a patient can sit up he can be carried by one of the improvised seats previously described.

To turn a helpless patient on to his side for any purpose, he should lie as straight as possible with his hands straight down by his sides; the attendant then places both arms underneath him, one under the chest and arms, and the other under the hips sufficiently far to bring the hands well round the further side of the patient, and then pulling (as it were) that side toward himself, and slightly raising his arms by the leverage so obtained the patient is turned on to his side. A patient should never be pushed over.

Weakly patients frequently need to be raised in the bed; this may be done by pillows or by a headlift, which may be part of the mechanism of the bed, or a separate construction.

In the latter case it is to be pushed under the mattress and is worked by a rack and pinion. When pillows are used a slope should be made by placing them first under the small of the back and rising gradually by additions until the proper height for the head is attained. Care must be taken that they are not so placed as to press the chin forward upon the chest, which would be irksome and injurious to the patient by obstructing the respiration.

In the use of the bed-pan the mode varies with the kind. If the old-fashioned circular pan is used, the patient must be lifted by one of the modes already recounted, and the pan be then placed under him. If the slipper form of bed-pan is the one, the patient should be turned on one side and the pan slipped under the buttocks.

CHAPTER VII.

CONCLUDING REMARKS.

I HAVE thus far endeavored, as briefly and succinctly as lay in my power, to describe the principal methods and devices which have been found by experience to be of value in the removal of wounded or sick persons, and the rules and directions for their useful application. I have endeavored also to point out the principles which underly these rules, and the objects which are intended to be attained by the various appliances. It has not been my object in this short essay to pass beyond these things nor to teach or describe the modes of rendering first aid to the injured—these matters are treated very ably and fully in many recent ambulance text-books, but the subject of our present study has not received from them the full and complete treatment which, I think, it deserves, and which I have attempted, however inefficiently, to render in this paper.

To my readers I would say a few words before parting. You, the men of my corps, and you ambulance students of wholly civil life, are alike engaged in one of the noblest and most beneficent works that could possibly occupy the minds and employ the faculties of men. To render assistance, valuable, nay, often invaluable, skilled, precious, intelligent, to your fellow-creatures in their darkest hour of agony, to soothe the pain, to relieve the anguish, to succor from the point of danger, and to being within reach of the resources of science is a work worthy of a god; and though your share may seem to some but humble it partakes of the godlike nature, and gives its own reward in your own good conscience and the indwelling knowledge of duty done and good work achieved, which only it is that makes this life worth living. In the hope that these lines may be of use to you in preparing and fitting you for this your noble task, I place it in your hands and leave it to the judgment of my professional fellow-workers, and to the unerring voice of the public for which it has been written.

CHAPTER VIII.

AN EASY DRILL FOR THREE BEARERS.

Number.—The bearers will number 1, 2, 3. No. 3 should be in command, responsible for all dressing and care of the injured part. He should also see that Nos. 1 and 2 break step in marching.

Place Stretcher.—The stretcher is now to be placed in a line with the patient's body, the foot of the stretcher to the head of the patient. The order is then given to

Take Post.—Nos. 1 and 2 take post at either side of the patient, and No. 3 at the lower extremities, on the injured side. Nos. 1 and 2 now go down on one knee, and each passing an arm under the patient's shoulders and under his thighs they clasp hands. No. 3 places both his arms under the legs of the patient; when all is ready the order is given to

Lift Wounded.—The whole will lift steadily and slowly, and the order given to

Close on Stretcher.—The whole take short side-paces, carrying the patient head foremost over the foot of the stretcher until his head is over the pillow, when the order is given to

Lower Wounded.—The patient is gently lowered on to the stretcher. Everything is now ready, and the bearers should get into position. No. 1 at the foot of the stretcher, with his back to the patient, and No. 2 at the head of the stretcher, with his face to the patient. The order is then given to

Lift Stretcher.—Both bearers bend down and grasp the handles of the stretcher, and they both lift, No. 1 relying on No. 2 saying ready; or, if he is not ready, saying stand fast. The order is then given to

March.—No. 1 leads off with the left foot, No. 2 following with the right, No. 3 marching at the side of the stretcher,

the same side as the patient's injury. Having reached their destination the order is given to

Halt! Lower Stretcher.—When it must be carefully lowered, afterward the bearers stand up and the order is given to

Lift Wounded.—When all three bearers proceed, as before described, to lay hold of the patient and lift him. The order is then given to

Close on Stretcher.—The whole take short side-paces, carrying the patient head foremost over the head of the stretcher, and he is placed on to the bed or couch prepared for him.

Note.—In lifting and lowering the patient the three bearers must always act slowly, deliberately, and in concert. If not, and especially in fractured limbs, they may make serious complications.

TREATMENT OF

INGROWING TOE-NAIL.

BY

JOSEPH AMIARD, M.D., PARIS.

TREATMENT OF INGROWING TOE-NAIL.

CHAPTER I.

On July 17th, 1889, Dr. Th. Anger communicated to the Society of Surgery a method of operation on ingrowing toe-nail which he has followed for the last seventeen years, and which in his hands has been followed by gratifying results. We have many times had occasion to see these operations on Dr. Anger's patients at the Cochin Hospital. The elegance of the method, the rapid and radical cure obtained by it, led us, on his advice, to make his method the subject of our inaugural thesis.

The subject is not a new one. Dr. Anger's method has already been described, though very briefly, in dictionaries, theses, in the manual of operative surgery by Guérin, and in "The Surgery of the Foot" by Blum; but it appears to us expedient to publish here some of Dr. Anger's cases which clearly show the success of his treatment.

It is not our intention to make a complete study of ingrowing toe-nail, or of the numerous operations which have, for centuries, been proposed for its cure, with various success. Such a complete review will be found in special books on this subject.

We wish simply to call to mind such points in the etiology of the affection as are obscure; then we shall rapidly enumerate the old methods of treatment most commonly employed; finally we shall say a few words on the mode of reproduction of the nail before studying the more radical operations, and more minutely that of Dr. Anger.

Etiology.—Incarnated toe-nail, "onyxis latéral" of Dupuy-

treu, "onyxis ulcereux" of Gosselin, is a chronic affection characterized by a fungoid ulceration of the lateral nail groove, and by the tendency of the nail to grow downward into the groove (Blum).

Suchard says that this affection is due to a mechanical irritation of the cells of the ridge bordering the nail, which inflame and proliferate, a very pronounced papillary hypertrophy results, and the cells of the bed and of the matrix of the nail are soon attacked by the same inflammatory process. At length the dermis becomes infiltrated, and ultimately suppurates, forming fissures, with detachment of the nail.

Ingrowing toe-nail has been met with in all the toes, and even in the fingers, but these are exceptional cases, for almost without exception its seat is in the great toe, and most often in the external lateral groove.

According to the statistics of Gosselin embracing fifty-four cases, it has only been observed in the adolescent; never before 14 and never after 30 years, and later authors appear to share his opinion.

Nevertheless it may be met with, though rarely, beyond these limits.

Reclus, in a clinical lecture delivered at the Hôtel Dieu, mentioned 3 cases in children of 10, 11, and 12½ years respectively, and Dr. Castex claims to have observed it in an infant of one year. We have met with a case in a child of 13, and Dupont in his thesis mentions that of a child operated on at the Hospital for Sick Children in 1872, by Dr. Anger.

Breton, interne at the Hôpital Tenon, communicated to us the case of a child of 12 years suffering from ingrowing nail on the inner side of both great toes.

We have seen it also in old subjects; one of 44 years, another in a policeman of 54, in a syphilitic woman of 54, in a carman of 39, in a painter of 46, and in a few patients above 36 years who were not operated on.

As to sex, our statistics confirm those of Gosselin. In a total of 121 cases, 17 were in women, which is about the same proportion as in Gosselin's cases.

Ingrowing toe-nail has been attributed to several causes. Traumatism resulting in contusions, sub-ungual ecchymoses, and detachment of the nail differs from "onyxis lateralis," but may predispose to true incarnation by aiding the other

causes. In the same way dirty habits, misconstrued hygiene, act indirectly so that the affection is met with more frequently in the poor, and in people who pay little attention to the needs of the body.

All authors do not agree as to the mode of its production; some incriminate the nail itself or the surrounding parts, *e.g.*, Boyer, Broca, Gosselin, Poncet of Lyons; but most surgeons attribute it to the construction of the shoes.

Boyer says that instead of the nail being cut square, people often round it off at the sides, and to this fact he attributes the downward growth of the nail. Thus, in walking, the pulp of the toe is pushed upward, and the skin is raised to a higher level than the nail, and forms a kind of rim around it; meanwhile the nail grows longer and tends in its turn to push the flesh downward and ultimately irritates it, which then inflames and ulcerates, which it does the more easily, according to Gaujot, because of the abundant perspiration which softens the tissues and renders them less resistant.

Again, the nail may act as an irritant because of its being too thick and of its having an exaggerated convexity. In walking, besides being pressed downward by the boot, the tissues are driven against it from below, and thus the nail being between two opposing forces tends to flatten out, and in doing so cuts the flesh as with a sharp instrument; in the same way a softened nail has not the force necessary to maintain the flesh in its place which then grows up above the nail and is inflamed.

In other cases the principal cause of ingrowing nail does not reside in the nail, but in the soft parts, or may even be a cutaneous lesion; and Gosselin thinks that the starting point is sometimes due to a moist erythema, or a slight attack of herpes occupying the lateral region of the nail and softening the tissues.

Beside those authors who attribute the evil to walking, there are others who attribute incarnation to an abnormal development of the nail and of the soft parts. Gosselin believes that a too rapid growth of the nail, and the consequent curving of its free border and of its side, may end in incarnation. But, says Poncet of Lyons, not only is the incarnated nail not thickened, nor of exaggerated dimensions, but on the contrary it is smaller, thinner, and flatter, while the extremity of

the toe is increased in volume and swollen into a club-shape. From studies made on individuals whose physical conditions were as nearly equal as possible—some quite healthy, others the victims of ingrowing toe-nail—he concluded thus: "The ingrowing toe-nail of adolescents results from a want of harmony between the development of the nail and that of the soft parts. The phalanx itself is often more developed than in a healthy toe. It is not the nail, as Gosselin thought, which by its rapid growth and increased dimensions penetrates into the lateral groove, but the soft parts, stimulated to increased growth by local irritations, which partly cover the nail, injure it, and are contused against it, and thus create onyxis lateralis of young subjects. It is a hypertrophy of the toe with atrophy of the nail."

Dupuytren, and with him Reclus, consider the pressure of the shoe as the commonest cause of this trouble. When it is too small, the vamp squeezes the toes against one another, and from lack of space they are superposed; the nail of the great toe is changed in direction, and points outward toward the lateral groove, this in its turn is pushed against the second toe, which then lies under the great toe and pushes the flesh upward, then it ulcerates and is cut by the border of the nail (Leucin, Lefort). Donzel denies this action of the second toe.

Beyond these mechanical causes on which authors have especially insisted, there are others more general in which the etiology of ingrowing toe-nail is less clearly shown, in which onyxis is, as it were, idiopathic.

In convalescence from acute diseases; in typhoid fever, of which Reclus reports a case with considerable fungoid growth; in the course of chronic diseases after considerable debility; in syphilis which acts through its cutaneous eruptions; in peri-onyxis, scrofula, diabetes (Verneuil); in individuals of a lymphatic temperament; in all these incarnation has been observed, and Gosselin has already noted the influence of the general state of the body, in the absence of any occasional cause.

In certain cases trophic changes may supervene in the inferior member after organic lesions, such as aneurism, but especially after central and peripheral nerve lesions; changes referable chiefly to the skin and the epidermal appendages, in which latter the nail is included.

The nail may become hypertrophied to such an extent that a paraplegic subject, for example, will suffer, while in bed, incarnation of his toe-nail. Anger has had under his treatment a patient of this class.

What information can we gather from this review? This, that all causes, taken separately, are either too exclusive or too absolute.

If the narrowness of the shoes were the main cause, incarnation of the nail should happen much more frequently in women, who, from vanity, imprison their feet in narrow shoes; but this is not the case, as all authors' statistics show as well as ours. On the contrary, men, and men who work hard, suffer most from the affection, especially those who stand a great deal.

In these, two causes act at the same time: pressure from the ground, and pinching boots, badly fitted to the foot, causing its deformation.

Finally, there are certain cases in which the true cause cannot be ascertained, as in old men and people whose occupation necessitates their leading a sedentary life; in these the pathology of the affection remains obscure. Perhaps in such cases, the influence of a debilitated constitution, together with the most trivial source of irritation (provided it be persistent), will be sufficient to start the ulcerative process; and Anger, when examining an ingrowing toe-nail in a bed-ridden patient, asks if there is not sufficient reason to assume some pathological agency as the cause of the ulcerative and suppurative process.

Examinations conducted by his interne, Morel, with a view to discover pus in several patients, had negative results.

As to the theories of Gosselin and Poncet, it is only the same problem differently put. What is the cause of the abnormal development being limited to the great toes, and why should the nail and the surrounding tissues surpass each other in rapidity of growth?

CHAPTER II.

PALLIATIVE TREATMENT.

THE operations proposed and performed for the cure of ingrowing toe-nail since the days of Paulus of Ægineta are numerous; and the difficulty lies rather in the choice of the treatment to be employed.

Some are simply palliative, and are directed either to the nail or to the exuberant growths; they destroy the diseased part only temporarily, and after a certain time it returns and retains the same original characters until such a time as the patient shall have become full grown, and the affection is cured spontaneously. Such mild operations are still employed by some surgeons, especially in their well-to-do patients, as those of Dionis and of Richter, who advise the scraping of the middle part of the nail with a piece of glass, so as to raise the incarnated border and lessen the resistance of the nail. Blaquière and Bézin follow the same method.

Fabrici of Aquapendente inserted a pliable substance under the border of the nail. Hervé and Moulinié used pledgets of lint, and Bonnet prepared sponges.

Desault placed a thin leaden plate, and Boyer one of tin, between the nail and the diseased flesh. Labarraque introduced underneath the incarnated border a little piece of tin which he used as a lever for raising the border of the nail and at the same time depressing the exuberant flesh.

Gaujot (thesis of Sacraste) interposed between the nail and the ulcers collodion mixed with cotton-wool well teased out. A process analogous to this was described by Patin, of Boulogne-sur-Mer, in the "Gazette des Hôpitaux," September 22d, 1887: the foot being well washed, he introduced by means of a small brush a solution containing one part of gutta-percha to nine of chloroform, into the groove of the nail; the chloroform deadened the pain, and on evaporation left a deposit of gutta-

percha on the exuberant ulcers, which protected them against the pressure of the nail.

All these operations are suited only to persons who have both the time and means of nursing themselves. Abucasis and Paul of Ægineta cauterized the exuberant growths with a red-hot iron so as to destroy them, liberate the incarnated nail, and thus obtain a more rapid cure. A. Paré and Brochet cut away that part of the pulp and exuberant growths which developed above the incarnated border. Lisfranc and Levrat, of Lyons, did the same operations, *i.e.*, they destroyed the exuberant growths by caustic and placed a prepared sponge between the nail and the flesh.

G. Monod recommends another process which is simple and efficacious so long as the evil is confined to the lateral groove, and the nail and its matrix are quite unaltered. He obtained the isolation of the soft parts by cauterizing them with nitrate of silver, and thus producing a solid eschar which protected them from irritation.

Of late, Dr. Pomarel prepares an external lateral flap, just beyond the diseased parts, which he then removes together with the fleshy part in which the border of the nail is imbedded. This flap is dressed in such a way that its upper border lies on a level with that of the nail. The flap is kept in place by little straps of adhesive plaster. Pomarel does not say whether or not he removes a portion of the nail and matrix.

At the present time Professor Guyon's operation, described by him to the Society of Surgery in 1862, and given at length in the thesis of Dupont, is a favorite with many surgeons. At each extremity of the ridge bordering the lateral groove of the nail, two transverse incisions are made deep enough and wide enough to allow the growth to be turned over and thus expose the bottom of the ulcer. The extremities of these two incisions are united by a third longitudinal one, drawn along the surface of the toe corresponding to the ingrowing side. From the surface of the toe so exposed he excises a small portion of the soft parts in such a way as to form a notch into which the flap should accurately fit.

Other authors operate on the nail alone. Thus Malgaigne cut away the incarnated portion of the nail; Larrey alone cauterized the exuberant growth with the hot iron, in addition.

Dupuytren's method is practised by many at the present time. After introducing beneath the nail one of the blades of a pair of straight scissors, the nail is split up the middle from before backward, and then by means of a pair of strong forceps each half of the nail is twisted from its bed.

Neret and Jensoul of Lyons insert a steel director beneath the nail up to its very root, and then by a sharp twist at the director right and left raise the entire nail from its bed. Desprez does the same operation, except that he uses a pair of strong forceps instead of a director.

Long proceeded in the same manner as Jensoul, but he entered beneath the nail from behind, after slightly dividing the skin which covered it.

Unfortunately none of these operations absolutely prevents a recurrence of the affection. If the flesh which grows over the nail laterally be destroyed, it forms again, or at least enough to constitute a rim or border on the side of the nail into which the nail will again grow; during walking, or when the body is in an erect position, the pulp of the toe will enlarge, and an irritation will ensue with the resultant inflammation and ulceration. If the ingrowing portion of the nail be removed, all goes well for some time, but as soon as it begins to grow again, and after it has attained a certain length, the same unhappy condition is restored (Dupuytren). The patient has only a few months' respite from the affection, for after a certain time the nail grows with the same vigor, incarnation again follows, and Gosselin says he has seen the same patient return on four different occasions to the service of Velpeau; indeed, until he had reached an age when the disease disappeared spontaneously.

In order that a radical cure may be obtained, it is necessary that not only the nail, but also the nail-producing tissue be removed. In most operations this is not done; the surgeon should therefore remove the exuberant growths, the ingrowing nail, and the matrix, the persistence of which is the cause of so many failures.

CHAPTER III.

MATRIX OF THE NAIL.

UNTIL recently anatomists were not all of the same opinion as to the mode of growth of the nail.

Sappey describes two distinct layers in the nail: a deep or mucous layer which is soft and white; and a superficial layer, twice or three times as thick as the deep layer, which, on transverse section, is distincly separated from it by a line of deeper shade, and by the arrangement of its cells, which, instead of being perpendicular to the nail's surface, are parallel to it and more flattened. The deepest cells of the deep layer adhere closely to the subjacent dermis, while the more superficial cells separate it from the horny or superficial layer. Thus the surgeon following the method of Neret, in the avulsion of the toe-nail, will only remove this corneous or superficial layer. Then, as Sappey remarks, the mucous or deep layer will protect the papillæ of the sub-ungual dermis, and the pain caused by the operation is quickly moderated.

These two layers of the nail are composed of nucleated cells surrounded by granulations—a character, says Sappey, which belongs only to the mucous layer of the epidermis.

It is about that part of the mucous layer which enters into the formation of the nail that authors so widely differ; some place the matrix not only in the retro-ungual groove but also in the sub-ungual dermis, while others confine it to the retro-ungual groove alone.

Kölliker, Sappey, and most French anatomists say that the sub-ungual dermis in its entire extent contributes to the growth of the nail, increasing its thickness by the addition of new cells to those which arise from the bottom of the retro-ungual groove. From the beginning of the formation of the nail, says Sappey, the sub-ungual dermis gives rise to the first layer of cells which cover it in its entire length. To this first layer another layer is soon added which pushes up the

former; then comes a third, a fourth, in a word quite a series of layers, the last of which pushes upward the layers preceding it, while the latter are pushed from below upward by the new cells of the root.

C. Dentu, in his article in his "New Dictionary of Practical Medicine and Surgery," also attributes the growth and renewal of the nail to the combined action of the retro-ungual groove and the sub-ungual dermis; but, he remarks, the lamellæ which form on the sub-ungual dermis are irregular, and have scarcely any tendency to form a continuous layer.

According to others, Reichert, Ammon, Hutchinson, Arloing, the sub-ungual dermis is inactive and only represents a smooth surface, the nail itself being formed at the semilunar surface, and at the bottom of the ungual groove. Beyond this semilunar border the nail does not increase in thickness.

Arloing, in his thesis, has carefully studied this subject. According to this author, the nail is formed at that part of the surface of the sub-ungual dermis which extends from the bottom of the upper groove to the semilunar border, and at the beginning of its growth throws out two prolongations: one toward the right and the other toward the left; these grow downward into the ungual grooves. Anteriorly the nail is simply supported by the dermis on which it slides.

This is the bed of the nail; the posterior part of the dermis is the matrix. In those parts which act really as matrix the sub-ungual dermis is entirely destitute of papillæ.

And further on, Arloing says: "If the nail be removed by the surgeon, or accidentally torn away by any cause which does not sensibly wound the matrix and bed of the nail, the sub-ungual dermal membrane is protected in the greater part of its extent by the mucous layer. The sub-ungual membrane inflames, becomes of a red color, and granulates; then, after a few days, it is covered by irregular horny lamellæ, which gradually assume the characters of a rough nail whose epithelial scales have a certain tendency to separate."

Simultaneously a smooth, semilunar plate, which possesses all the appearances of the preceding nail, is being formed at the semilunar surface. Gradually this semilunar plate stretches forward while the rough plate shrinks, and at the end of some months the phalanx is covered by a true translucent nail, whose regularity of outline is sometimes not perfect.

The rough nail, which in a short time has covered the sensitive parts, serves only as a temporary protection to the vasculo-nervous organs, until such a time as the true nail shall have been formed.

M. Quènu, in 1887, definitely settled the question, by bringing to the support of his opinion some new experiments. Having twisted off the nail, he removed the entire semilunar surface without touching the anterior part of the sub-ungual dermis. If all the cells of the dermis were endowed with the power of forming nail substance, the nail, or at least its anterior part, would form again; while, if only the cells of the semilunar border are so endowed, the nail will not form again; and this is what happened. At the anterior and undisturbed part only a few lamellæ of horny substance were formed, which did not cohere to form a membrane or nail substance.

These facts demonstrate that the matrix of the nail consists merely of that part of the ungual dermis situated behind the anterior arc of the semilunar border.

If then, in the treatment of ingrowing nail, the surgeon, remembering this fact, removes this semilunar surface, or that part of it corresponding to the ingrowing portion of the nail, nail substance will not again be formed, and incarnation cannot take place. This method of operating will place the patient beyond the possibility of relapse, and should be classed among the best operations. It is a radical operation.

CHAPTER IV.

RADICAL TREATMENT.

THE following are the radical operations employed by many surgeons since the beginning of the last century, among whom may be mentioned Dupuytren, Baudens, Voillemier, Vanderbach, and in our own time Gosselin, Follin, Reclus, Anger, and Quènu.

Dupuytren made a semicircular incision backward from the apparent origin of the nail, comprising the entire matrix, which he removed.

Boyer, after removing the nail, confined himself to compressing the matrix forcibly enough to secure its atrophy.

Scouttenten and Donzel applied caustics to the matrix, after an ample incision of the skin which covered it.

Labat cauterized the matrix with the hot iron, and the nail fell off spontaneously a few days later.

Voillemier, after avulsion of the nail, destroyed the matrix and all the surrounding parts.

Baudens and Gerdy, instead of removing the entire matrix, only removed the diseased part. Holding the scalpel as one would a pen-knife when dressing a pen, Baudens plunged the blade perpendicularly down to the bone, about a quarter of an inch above the root of the nail, in order to insure the destruction of the matrix. The instrument is then laid on the upper surface of the nail, at the same time that the fingers of the hand which hold the knife are flexed on to the palm of the hand; in this way he removes all that portion of the nail covered by the flesh and the flesh itself.

Larrey, Vanderbach, and Kremer cauterized the diseased part; the latter with a red-hot iron, the two former with caustic potash.

At the present time Gosselin and his students, after twisting off the ingrowing part of the nail by Dupuytren's method, excise a little strip of skin comprising in front a part of the

cutaneous ridge and the abnormal fungoid growths behind, and the external lateral part of the matrix of the nail.

Reclus may also congratulate himself on the success of an analogous process. He also twists off the incarnated half of the nail, and with the thermo-cautery he destroys the ulcerated lateral ridge, the lateral groove, and the exposed part of the matrix. After an iodoform dressing for from ten to fifteen days the patient is cured.

Follin makes a square by four incisions including the exuberant growths, the incarnated portion of the nail, and the sub-ungual dermis and matrix.

In his clinics at Hôtel Dieu, Reclus speaks highly of a process which M. Quènu made the subject of a paper read before the Society of Surgery, April 13th, 1889. It is really the practical application of Quènu's ideas regarding the development of the nail. After twisting off the nail, the surgeon makes a transverse incision in front of the semilune and a tangent to its anterior arc. This incision includes the ulcerated lateral ridges, and is continued into the healthy skin. From each of its two extremities an antero-posterior incision is made about three-fourths of an inch in length, reaching beyond the intra-phalangeal joint. The flap thus marked out is dissected out to its posterior insertion. It comprises all the dermis of the semilune and of the retro-ungual groove, and the teguments on the dorsal surface of the phalanx. With one cut of the bistoury the portion of this flap which forms the posterior part of the bed of the nail is resected backward; then two horse-hair sutures suffice to maintain this flap in contact with the sub-ungual dermis which has been left undisturbed. M. Quènu cites ten cases treated in this way without relapse. The period of treatment lasted from three to twenty-two days; one alone required a month.

The author recommends his treatment, but only in cases of onyxis bilateralis; where only one side is affected he prefers the auto-plastic operation of Anger.

This operation, which I am now going to describe, the greater part of which is taken from Dr. Anger's paper read before the Society of Surgery, consists essentially in the preparation of a lateral flap from the ingrowing side of the toe, in the removal of the ingrowing part, nail, matrix and exuberant growth, and in the re-application of the lateral flap.

Dr. Anger commences by anæsthetizing the affected toe. Some years ago he used ether spray, but this was neither quick enough nor was the anæsthesia sufficient. Then, following the example of Velpeau and Gosselin, he used as a substitute ice and sea-salt. Velpeau allowed this mixture to remain in contact with the toe for five minutes. Insensibility was complete during the operation, but the reaction therefrom was very painful, and gangrene of the toe was to be feared. Gosselin kept it in contact for two minutes, and after the lapse of this time he examined the toe so as to ascertain the degree of anæsthesia produced which must have been absolute, judging from our observations in Dr. Anger's patients.

Dr. Anger removes the mixture after one minute's contact, and never later than after one and a quarter minutes.

After this time anæsthesia is sufficient to proceed with the operation almost without pain, and there is no fear of the painful reaction so much to be feared by Gosselin and Velpeau's method. But it is important that the contact of the ice should be perfect over the entire circumference of the toe.

Having obtained anæsthesia, the surgeon seizes the bistoury, or better a long, very narrow knife with a thick resistant back, transfixes a lateral flap from the base of the diseased nail, starting from a little in front of the articulation and terminating at the point of the toe. In forming this flap the knife should be directed in such a way as not to include any of the exuberant growth in the flap. The flap having been formed, it is folded backward, toward the bone of the toe, and the knife is placed in the angle thus formed, the blade being directed toward the matrix of the nail; then the surgeon divides the tissues until the edge of the knife is arrested against the bone.

Making the blade of the knife describe the quarter of a circle, he cuts the flesh; and keeping the blade so close to the bone as to scrape it, he removes the diseased parts in one slice.

The author considers this the most important part of the operation, that on which the radical cure depends. It is known that the sub-ungual dermis adheres intimately to the bone of the third phalanx, and in fact forms one continuous membrane with its periosteum, and runs backward almost to the articulation and up to the tendon by which the extensor communis digitorum is attached to the three phalanges, and corresponds

consequently to almost the entire length of these (Sappey). If the matrix is not removed a relapse will ensue; and it is this that Baudens wished to prevent by carrying his knife down to the bone; Dr. Anger does not fear the removal of a thin lamella of bone which, being a clean incision, causes no inconvenience. He scrapes the bone at least a quarter of an inch behind the visible part of the nail. The part removed includes all the diseased tissues, exuberant ulcers, the border of the nail, and the corresponding matrix.

After the operation he waits about ten minutes for the

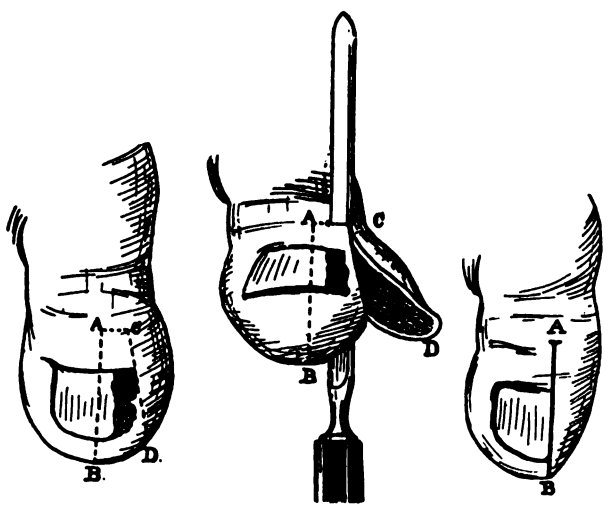

FIG. 1.—D C A B, Line of Incision.

FIG. 2.—The Flap C D being severed, the knife is brought out at B and follows the line C A B close to the bone.

FIG. 3.—The Toe after the Operation.

restoration of the circulation, and the cessation of hemorrhage; then he proceeds to the dressing. This is of the simplest nature.

Dr. Anger does not apply any sutures; he simply adjusts his flap on the toe, and maintains it in situ by means of some strips of adhesive plaster. It is very important that the base of the flap should be in perfect contact with the toe; this is sometimes difficult enough to do because of the loss of substance necessitated by the removal of the matrix.

The strips of plaster are covered with a layer of cotton-wool, and slight compression is made with a band of tarlatan; but in making this compression two stumbling blocks are to be avoided: first, an insufficient compression which does not insure union by first intention; secondly, too strong compression which may cause sloughing of the flap at its anterior extremity.

This dressing is allowed to remain for eight days, after which union is obtained. But it is not prudent to permit

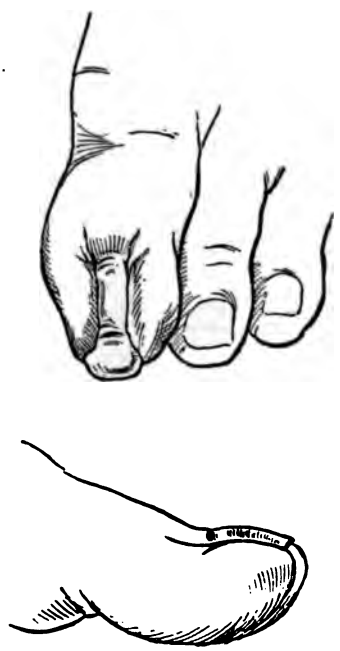

FIG. 4.—A Toe Eighteen Months after Operation.

the patient to walk before the tenth or twelfth day, lest the flap should become detached and inflame.

Often, too, it is a good plan to encircle the toe for some days with a layer of cotton wool, and exercise slight compression upon it by means of a thin band.

In 121 cases operated upon in this way, all, with hardly any exception, were effectively and rapidly cured. Many suffered from onyxis bilateralis of one or both toes, and the cure in these cases was as perfect as in the simple form.

CHRONIC BRONCHITIS

AND ITS TREATMENT.

BY

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CHRONIC BRONCHITIS.

CHAPTER I.

INTRODUCTORY.

THERE is probably no complaint more prevalent in England, and especially in London, than winter cough. It derives its importance not from its fatality but from the fact that it returns year after year with unvarying regularity, rendering the life of the unfortunate sufferer miserable and incapacitating him from following his avocations. We recognize it clinically, being only too familiar with its salient features, although, curiously enough, it corresponds to no definite pathological condition. It may be said to be of a somewhat composite character, including as it does bronchial catarrh, chronic bronchitis with or without emphysema, bronchiectasis, and a small percentage of cases of quiescent or arrested phthisis. The people who suffer from this condition are chiefly those who from the nature of their occupations are exposed to the inclemency of the weather. In the hospital, for example, we see it among fishmongers, who have to get up early and who transact their business in open shops; in bargees and lightermen, who periodically fall into the Thames and have to be revived with gallons of beer; in cabmen, who are exposed to all sorts and conditions of climatic influences; in unattached clergymen, who bareheaded hold forth in the streets and alleys; and in furnace-men and gas-workers, who are usually frozen on one side and roasted on the other. In women it is just as common, their periodical attempts to improve the census returns lowering their powers of resistance and leaving them very susceptible to atmospheric changes. In the out-patient department of our hospitals we meet with it in laun-

dresses, ironers, and char-women, and people of that class. It would seem that constant exposure to the fumes of the wash-tub, with the combined odor of soft soap and dirty linen, is somewhat trying to the mucous membrane of the bronchial tubes; while the pursuit of charring, with the accompaniment of something short, usually in the shape of a glass of raw gin, is equally inimical.

The chief symptoms of the complaint are cough and expectoration, shortness of breath, especially on exertion, and a sense of pain or rawness in the chest and behind the sternum. There is as a rule no constitutional disturbance, and after the first few days of the recurrent attack the temperature is not elevated and there is no quickening of the pulse. The patient may lose flesh, but as a rule it is only a temporary and not a progressive loss. (In some cases, however, as Walshe has pointed out, "as much weight is lost during the first three weeks of an annual recurrence of chronic bronchitis as during the same period in the average of cases of consumption in active progress." This, however, is exceptional.) The winter cougher is rarely thin or emaciated, and often turns the scale in the neighborhood of eighteen stone. The cough is as a rule his chief trouble and the one from which he is most anxious to be relieved, but sometimes the dyspnœa, from the inconvenience which it affords him, monopolizes his attention. The cough, it must be remembered, is not a little hacking, lady-like cough such as you get in the early stage of phthisis, but a violent paroxysmal cough which comes on in gusts and lasts for some time. It is bad all day, but it is especially bad the first thing in the morning, before the patient has succeeded in "clearing his chest." This cough is a nuisance not only to the patient himself but to a large circle of his acquaintance. The expectoration usually flows freely, and consists of yellowish, white muco-purulent matter, with an occasional touch of green. Sometimes it is fetid, the odor being due to sloughs of minute portions of the mucous membrane or to commencing decomposition in the sputum itself. On microscopical examination the sputum is seen to consist of epithelium, pus cells, and granular matter, with perhaps a few blood-corpuscles. In the condition known as bronchorrhœa it is extremely copious and is usually thin and watery, but it may be thick, ropy, sticky matter not unlike the white of egg. In exceptional

cases there is no expectoration at all, the bronchitic condition assuming the form which is sometimes known as catarrhe sec. Sometimes, too, instead of the orthodox expectoration, casts of the bronchial tubes make their appearance and are expelled with difficulty. They may be either solid or hollow, and on examination are found to consist of concentric laminæ of amorphous or fibrillar material. In ordinary cases of winter cough the patient rarely spits blood in any quantity, although occasionally the sputum may be streaked as the result of an unusually violent attack of cough. In bronchiectasis, however, there is often abundant hæmoptysis from the dilated bronchial tube, the quantity being as great as in phthisis. Next to the cough the dyspnœa is the most troublesome symptom. It is especially trying to the patient, as it incapacitates him for exertion of any kind. He is all right as long as he keeps quiet, but as soon as he attempts to hurry he gets out of breath and has to come to a full stop. He cannot walk fast, much less run, and hurrying to catch a train is out of the question. He presents the appearance of a person who is chronically out of breath, and when the dyspnœa is at its height there is a certain lividity about the face which gives him a peculiarly pained and anxious expression.

On a physical examination of the chest nothing wrong may be detected, but in old-standing cases there is always more or less emphysema, the antero-posterior diameter being increased, respiration divided, and expiration prolonged. Expansion is usually deficient, and it may be difficult to get the patient to take a deep breath. The breath sounds are harsh and loud, and are often accompanied by dry, coarse, moist, or bubbling rhonchi. The moist sounds are usually heard most distinctly at the bases of the lungs posteriorly, and often they can be detected only the first thing in the morning. The successive long-continued attacks lead in time to the development of other structural changes; the mucous membranes secrete more abundantly than natural, even during the quiescent period of the disease; the right side of the heart becomes dilated and hypertrophied; systemic venous congestion ensues, and finally anasarca, and hepatic and renal complications follow. The bronchitis itself rarely or never kills except in very old people, but indirectly it only too surely paves the way for death.

Such, then, is a brief sketch of the symptoms of a common complaint which is only too familiar to every one. Respecting its treatment our text-books are somewhat reticent. We are usually told that counter-irritants, inhalations, stimulating medicines, tonics, and good diet are indicated, while especial attention should be paid to hygienic measures. This, to say the least of it, is unsatisfactory, and I cannot help thinking that there are certain modes of treatment over and above these which may in suitable cases be resorted to with advantage. During the last ten years I have carried out systematic observations on this point, and I am satisfied that much may be done, if not to cure our patients, at all events to alleviate their sufferings. In the medical out-patient practice of a general hospital cases of chronic bronchitis largely preponderate, and during the winter months they form the great bulk of patients under treatment. My clinical clerks have taken notes of a great many cases, and of their observations I have not hesitated to avail myself freely. Many of the patients come to us for treatment year after year, so that their histories during a succession of attacks are familiar to us. They in time become experts, so that they are enabled to tell with an accuracy almost approaching certainty what special drug or mode of treatment suits them best. Many of them are keen observers, and although we have to guide them at first, they after a time are in a position to afford us valuable information. As a rule some special method of treatment has been tried every winter, but from this we do not hesitate to depart as necessity arises. New modes of treatment have been grafted on the old, but have not been employed to their exclusion. The indications for the employment of each drug have been carefully noted, so that in any given case a fair amount of accuracy has been arrived at in prescribing the appropriate remedy. The old-fashioned expectorant mixtures have been prescribed without stint, but when they fail, as is not uncommonly the case, we do not hesitate to resort to other methods of treatment.

CHAPTER II.

THE IPECACUANHA AND OTHER SPRAYS.

THE first method of treating chronic bronchitis to be considered is one originally introduced into practice by Dr. Ringer and myself, and described in a paper, "On Ipecacuanha Spray in Winter Cough and Bronchitic Asthma," which appeared in the "Lancet" of September 5th, 1874. We had heard a great deal about the successful use of a secret remedy for these complaints by an irregular practitioner both in London and Paris, and thought that we should be doing good service if we were to unearth it and publish our results. We had very little to guide us, for apparently the proprietor of the remedy varied its composition from time to time to escape detection. Some people said it was a clear fluid like water, while others were equally confident that it was colored; some of them affirming that it was yellow, while others thought it was bright red, or even blue. Some were sure it was tasteless; others were equally positive they recognized the not unfamiliar flavor of sherry. They all agreed, however, that it was used as a spray, and that the results were little short of marvellous, a few inhalations affording prompt relief both to the cough and shortness of breath. It always loosened the phlegm, and frequently gave rise to copious expectoration. It obviously belonged to the class of remedies which we call expectorants, and there was no reason to suppose that it was a rare or unknown drug. Our sphere of investigation was, fortunately, considerably narrowed, for many remedies are obviously unsuited for administration in this particular form. We made a number of trials, which served to convince us that even if the secret remedy were not ipecacuanha wine, that very simple and familiar medicine entered largely into its composition, and that, when used as a spray, it formed a most useful application for congested and irritated bronchial mucous membranes.

To prevent any misconception respecting the nature of the

cases treated, the following is given as a typical example, although it is not the record of any one case, but simply the reflection of a large number:

The patient has been troubled with winter cough, perhaps, for many years. During the summer he is pretty well; but during the cold months, from October to May, he suffers sometimes without intermission, occasionally getting a little better and then catching cold; or perhaps he may lose the cough for a few weeks, but again takes cold on the slightest exposure. His breathing is so short that he can walk only a few yards, especially in the cold air, and finds it hard work to get upstairs, and is often quite unfitted for active life. The breathing grows worse at night, so that he cannot sleep unless the head is propped up with pillows. He is troubled, too, with paroxysmal dyspnœa, usually at night, lasting several hours, and compelling him to sit up in bed. Sometimes the breathing is difficult only on exertion, and in those cases it is made much worse by fogs, east winds, and damp. The expectoration varies greatly: in a few cases there is very little; usually, however, it is rather abundant, and consists of mucus or pus. The cough is violent, frequent, hacking, and paroxysmal, the fits lasting from ten to twenty minutes, and perhaps even exciting vomiting. They are generally brought on by exertion, and, in bad cases, the patient is almost afraid to speak, much less to move. Sometimes the cough is slight, and then the expectoration is generally scanty, the distressed breathing being the chief symptom. The patient wheezes badly, especially at night, and the legs are swollen. He is distinctly emphysematous; there is often no rhonchus, but there may be a little sonorous or sibilant rhonchus or bubbling, especially at the bases behind.

The apparatus employed was very simple, consisting of nothing more elaborate than a common double-ball spray apparatus such as is used for the production of anæsthesia by ether. The observations were made originally in the months of January and February, and the first series of cases included twenty-five patients. It is only fair to say that they were all bad cases, for we purposely selected the most intractable we could find. Some were men and some women, their ages ranging from thirty to seventy. They were not confined to the house, but were allowed to follow their ordinary avoca-

tions. Most of them had been sufferers for a good many years, so that they were not very sanguine as to the result, having had abundant experience of other methods of treatment. At first pure ipecacuanha wine was used, but after a time it was found advantageous to dilute it with twice its bulk of water.

Sometimes the first application of the pure wine excites a paroxysm of cough, lasting for some minutes, so that caution has to be exercised in its use. As a rule, however, patients get accustomed to it after a few trials, and take it freely into the lungs. Some people involuntarily arch up the tongue, so as to bring it in contact with the roof of the mouth, and obstruct the passage of air; but as they gain confidence they cease to do so, and no difficulty is experienced. As they go on inhaling, they take it more and more freely, until at last they declare that they can feel it going right down to the bottom of the chest. The shortness of breath is the first symptom relieved, and many patients report that, after the first inhalation, they have a good night's rest, even when for weeks previously their rest had been broken by fits of coughing and paroxysms of dyspnœa. The shortness of breath on exertion is also promptly relieved, the patients often walking home after a single application with an absence of effort which surprises both themselves and their friends. In some instances the expectoration is increased for the first few days, but this is a good sign, and may be taken as an indication that there will soon be some amelioration of the cough. The improvement is noticed in spite of exposure to cold, and fog, and damp, and even east winds.

Of the twenty-five patients referred to as constituting the first series, all except one were materially benefited. Since then the treatment has been adopted in a much larger number of cases, and equally good results have been obtained. A few typical instances are given in detail to indicate the progress of the improvement. The first and second cases are old ones and are reproduced from the article already referred to, while the others have been under observation this winter.

CASE I.—This is a favorable case, in which the benefit was prompt and decided: "Jane H., æt. 72, has had a cough every winter for the last three years. It comes on in fits, and is espe-

cially bad at night, being greatly aggravated by foggy weather. She expectorates about a tea-cupful of thick yellow phlegm in the twenty-four hours. So bad is her breath, that she cannot lie down at night, but is propped up with pillows, and is always wheezing. She is obliged to stay at home for weeks together. Her lungs are emphysematous, and sonorous râles are heard over the whole chest. After the first inhalation there was marked improvement, there being little or no cough at night and not much shortness of breath. Further improvement was noticed after the next day's inhalation, and still more after the third; so that on the sixth day of treatment, and after three inhalations, she said that her breathing was not nearly so troublesome, and that she did not spit half so much. The expectoration, instead of being thick and yellow, was white and frothy. At the end of a fortnight she was well enough to take charge of a small shop, although previous to her attendance at the hospital she had not been out of her room for four months. She came, a month later, to say that there had been no relapse."

CASE II.—The next is a fair specimen of an obstinate case treated by the same method: "Mary A., æt. 32, came to the hospital on January 29th, with a winter cough of many years' standing. She reports that it is worse this year than it has ever been before. It is paroyxsmal, the slightest exertion, even talking, bringing on an attack. The attacks vary much in duration, but rarely last less than ten minutes. In the twenty-four hours she expectorates quite a tea-cupful of thick yellow phlegm. She is extremely short of breath, is quite unable to do her housework, and at night cannot sleep unless propped up with three pillows and a bolster. The breathing is worse at night, and fog increases all her troubles. She has been hoarse for weeks, and her voice goes if she attempts to talk. Her chest is very sore from coughing, and she aches all over. She is emphysematous, and the breath sounds are obscured by cooing râles. On February 3d the patient, who had an inhalation on five consecutive days, said she was better in every way. The breathing was easier, the cough was not so violent, her chest was not so sore, the expectoration was less, and the hoarseness had nearly gone. Three days later, the inhalations having been continued meanwhile, she reported that she was better than she had been all the winter. The

improvement in her breathing is so great that she can now do with only one pillow instead of three. She sleeps better, and there has been great improvement in the cough, which, instead of being aggravated at bedtime, is easier. Expectoration has almost ceased. On the 10th, having had no inhalation for three days, she complained that there was shortness of breath. On the 12th, after two more inhalations, it was better. On the 17th the note was: 'Has had but one inhalation since last date. The cough has now almost left her, and she often goes twelve hours without a fit. Her breathing is so much better that she does her own housework, and is not propped up at night.' She was discharged after ten inhalations and nineteen days' treatment. A month later she called and said that her breathing was all right, and that, with the exception of a slight hacking cough, she had been perfectly well since her discharge."

The number of inhalations required in most cases of winter cough ranges from four to eighteen. The longest case under treatment was twenty-four days. One inhalation a day will usually suffice to effect a cure, but better and more speedy results are obtained when the patient can inhale night and morning, or even three or four times a day. The fluid which accumulates in the mouth from the spray should not be swallowed, or it may excite nausea. The duration of the inhalation varies in different case and in different stages, but it should rarely exceed ten minutes.

The ipecacuanha spray was used with very satisfactory results in several cases, of which the following may be taken as a type:

"A patient for several years has suffered from severe winter cough, with much dyspnœa, cough, and expectoration, and on several occasions has spat up a considerable quantity of blood. The physical signs denote slight fibroid consolidation, with excavation at both apices, and much emphysema, perhaps atrophous in kind. There is little or no rhonchus, and no fever. The expectoration may be slight or very abundant, muco-purulent or purulent. The dyspnœa is perhaps very severe, and is so paroxysmal as to justify calling the case bronchial asthma, with emphysema and fibroid phthisis. In these cases the ipecacuanha spray is almost as beneficial as in the

preceding. It soon controls the dyspnœa, enabling the patient to sleep, and greatly lessening expectoration and cough. As in the previous cases, the first inhalation may considerably improve the breathing, though the effects are not so permanent, the dyspnœa returning in the evening; so that spraying is needed night and morning, and may be necessary for weeks or months, the ipecacuanha appearing rather to give relief than to permanently cure dyspnœa."

I have had several cases of fibroid phthisis under treatment in which the spray has afforded very considerable relief. The following is a case in point:

CASE III.—"Fred. L., a mason, æt. 29, came to the hospital on November 20th, and gave the lollowing history. He had a cough last winter for the first time; it lasted from Christmas to June, but he was free from it during the rest of the summer. This year he has had it seven weeks. It comes on in paroxysms, four or five in the day, each lasting from five to ten minutes. The attacks are so severe that he has often to stop in the street and hold on to the railings. He is sick after a violent attack, and this has greatly reduced his strength. The expectoration is watery, not thick, and there is usually a pint or more in the twenty-four hours. He spat blood several times last winter, but only in small quantities. The loss of flesh has been considerable, and he weighs two stone less than he did twelve months ago. He is much troubled with shortness of breath, and has some difficulty in getting up-stairs. He lives only a mile from the hospital, but it is farther than he can walk, and he has to take the omnibus. His voice is getting weaker, and he is so ill that he has done no work, except an odd job here and there, for over a month. On examining the chest, the signs of a dry cavity were apparent at the apex of the right lung. He was given an inhalation of ipecacuanha wine on three consecutive days, and at his fourth visit he said that the cough was easier than it had been for many months. The sickness in the morning had left him, and he could walk with comparatively little difficulty, and even get up-stairs. He continued to improve under this treatment, although somewhat slowly; and after the sixth inhalation his chest was painted with iodine liniment over the side of the cavity. From this time he progressed much more

rapidly, and at the expiration of a fortnight he was discharged, after ten inhalations, comparatively well. No other treatment was adopted."

The following is a case of phthisis, complicated with asthma, in which the ipecacuanha spray was the means of affording considerable relief:

CASE IV.—"C. E. M., a French polisher, aged 30, stated that he had had a cough in the winter as long as he could remember, but never in the summer, until the present year. He usually expectorated a great deal of green, frothy material. He had spat blood at times, but only in small quantities. His most distressing symptom was shortness of breath. On going to bed he finds it impossible to lie down, but manages to get a little sleep, propped up in bed. About two o'clock he usually awakes, and then has a bad attack of cough, accompanied by expectoration. He is short of breath the greater part of the night, and in the daytime suffers severely on the slightest exertion of any kind, and he always has an attack after dinner, often lasting two hours. He is afraid to eat a good meal, and has lost in twelve months two stone in weight. He now weighs only six stone seven pounds, and is so weak that it is impossible for him to follow his occupation. On examining the chest, it was found that there was consolidation at the apex of the right lung, and sibilant rhonchus was heard all over both sides, with moist rhonchus at the bases. He was, undoubtedly, suffering from phthisis, and from the preponderance of the asthmatic element it was feared that the ipecacuanha spray would hardly prove suitable. It was determined, however, to give him the benefit of the doubt, and, as his condition was somewhat critical, an inhalation of the pure wine was prescribed. It, fortunately, produced no dyspnœa, and the cough was relieved, although not to any great extent. Two days later the treatment was repeated, and he then reported that it had facilitated expectoration, and relieved the shortness of breath. He had no longer the choking sensation in the throat, and his rest was less disturbed at night. The dose of the ipecacuanha wine was gradually increased, and on one occasion as much as an ounce was used in the Siegle's spray apparatus at one sitting. Much of this was, of course,

not absorbed, as the apparatus was placed at some distance from the patient's mouth, but he derived great benefit from it, and his attacks of dyspnœa being milder and less frequent, he took considerably more food. After the sixth inhalation it was thought right to give him cod-liver oil and Fellow's syrup of the hypophosphites, on which he improved still more rapidly, gaining flesh remarkably. He was sent away to a convalescent home on the south coast, and two months later he returned, and reported that he had resumed work. The result was most satisfactory, especially as the patient's condition, when first he came under observation, was undoubtedly critical. It should be mentioned that, at his last visit, his chest was re-examined, and that it was found that, although the rhonchus had entirely disappeared, the signs of consolidation at the right apex were still apparent.

In cases of bronchial asthma, the ipecacuanha spray sometimes aggravates the attacks; but, on the other hand, it sometimes affords very prompt relief. It is especially difficult to cure these patients without confining them to the house, as they very readily catch cold, especially in bad weather. The following is a case in point:

CASE V.—"A woman, who for many years had suffered from bronchial asthma, came to the hospital, complaining that she was unable to lie down at night from shortness of breath. She suffered from violent paroxysmal dyspnœa, the worst attack usually coming on about three o'clock in the morning, and compelling her to start out of bed and struggle for breath. She was very emphysematous, and her voice was hoarse. The first inhalation removed the hoarseness and much improved her breathing, which continued freer till midnight, when the dyspnœa returned. The cough was eased, and she expectorated freely. Each inhalation always gave her very great and marked relief. She walked to the hospital with great difficulty, and was constrained to stop frequently. On entering the room she could not speak, but labored violently and with loud wheezing to get her breath. A few inhalations would gradually set the breathing free, so that the air entered more and more, and the wheezing gradually left, till, on the completion of the inhalation, she could breathe

without difficulty. As the breathing improved, she could feel the spray descending lower and lower into the chest. At first it would seem to reach only the back of the tongue, then the top of the sternum, then descend to mid sternum, and at last she felt as if it reached as low as the pit of the stomach. This improvement was maintained through the day, but at evening a relapse would occur, so that her nights, though at first bad, were still better than before the treatment. Soon, however, the effects became more lasting, and she slept well. On discontinuing the spray, however, her breathing again grew worse, and she was obliged to revert to the treatment, but, unfortunately, she so soon caught cold and the weather was so bad that she was obliged to stay away for days together. While her breathing improved, the cough and expectoration also improved, but these two symptoms continued rather troublesome."

In cases such as these the ipecacuanha should be freely diluted, and it is best either to warm the mixture or to add hot water. In bad cases of bronchitic asthma the spray should be used two or three times a day, and the treatment may have to be continued for some time to ward off the dyspnœa, for the bronchitis takes a considerable time to cure. The improvement, however, is often so marked as to astonish the patient.

When there is a tendency to asthma the spray must always be used with caution and the ipecacuanha wine should be freely diluted, or a severe paroxysm of dyspnœa may be excited.

CASE VI.—"Charles S., aged 59, a carpenter by trade, came to the hospital complaining of a cough from which he had suffered in the winter for three years. It came on usually about November, lasted till February or March, and left him in the summer. He had several bad paroxysms every day, often as many as nine or ten, lasting from three to five minutes each. Sometimes it disturbed him at night, but usually he slept well till the early morning. The expectoration was white, frothy, and extremely abundant. His breath was very short indeed, especially on exertion, but he did not know that he had ever had an attack of asthma. He was not quite sure, but he thought the shortness of breath never came on with-

out a previous attack of cough. His breathing was certainly very bad, and if he could only get that right he did not care so much, he said, for the cough. He came of an asthmatic family, and his father had suffered terribly from that complaint all his life. On an examination of the chest there was found to be well-marked emphysema, and his blood-vessels were noticed to have undergone marked degeneration. The patient was given an inhalation, not a large one, of equal parts of ipecacuanha wine and water, the Richardson's spray apparatus being employed. It was noticed that he inhaled remarkably well, the spray evidently entering the chest freely. Immediately, almost before the operation was over, the patient was seized with a violent attack of dyspnœa, and complained that he could not get his breath. He rushed to the open air, his face became livid, and he was unable to stand without support. Some chloroform was obtained, and he was made to inhale the vapor from a piece of lint. The spasm almost immediately relaxed, and in a few minutes he said that he was perfectly comfortable and could breathe easily. He came the next day and declared that the treatment had done him a great deal of good, and seemed most anxious to have it repeated. This time a much weaker solution was given, one part of the wine to six of water, and the inhalation was confined to one hundred squeezes of the bellows. This produced no dyspnœa, but he expectorated a great deal of thick white phlegm. After this the strength of the mixture was increased to one in three, and it was given more freely, but it produced no inconvenience. On one occasion a preparation of ipecacuanha was made with rectified spirit and water of the same strength as the wine, but he greatly preferred the sherry. He had no return of the dyspnœa, and after nine inhalations was discharged perfectly well."

Since the original publication of our paper I have used the ipecacuanha spray on about two hundred patients suffering from chronic bronchitis and winter cough, and successful cases have been recorded by the score both on the Continent and in America.

The following may be regarded as typical of a large number of cases which have been under treatment at the Westminster Hospital during the last six months:

CASE VII. (reported by Mr. E. Lucas Hughes, Clinical Assistant), showing the value of the ipecacuanha spray in bronchial catarrh.—"David J., æt. 53, a cigar-maker by trade, has had a cough in the winter for twelve years or more. There is not much dust in his work, and he is not exposed to wet or cold, but he has travelled a good deal, and has known what it is to rough it. He has been to America fourteen times, to Australia, the Sandwich Islands, and many other places. He is fond of going about, and as he is a good hand at his work, and can always get employment, he sees no reason why he should always stay in one place. The cough is troublesome, but is not paroxysmal. There are no bad attacks of cough, but there is a good deal of hacking, and this keeps him awake at night. There is very little expectoration, certainly not enough to give him any trouble. He has had no hæmoptysis, and has not lost flesh. On examining the chest the percussion note is found to be normal. Small râles are detected at the left apex in front, and at the right base posteriorly. The patient was given 15 c.c. of ipecacuanha wine with an equal quantity of water, by a stream spray apparatus, and this was repeated on three successive days, the dose being gradually increased to 30 c.c. On the fourth day the hand-ball spray was used, and at the expiration of the week the patient reported that his cough had entirely left him, and that he was practically well. On examining the chest it was found that the rhonchus had disappeared."

CASE VIII.—Case of chronic bronchitis and winter cough (reported by Mr. Hughes) illustrating strikingly the benefit which may frequently be obtained by the use of the ipecacuanha spray:—"Francis P., æt. 58, has suffered from winter cough for the last twenty-five years. He gets rid of it for only a short time in the summer, and for the last thirteen years it has been not a winter cough, but a winter and summer cough as well. This year he has had it badly since the beginning of December. It comes on in fits, which often last ten minutes. He always has two or three bad bouts of it in the daytime, and one or two at night. If they come on when he is out he has to cling on to the railing, or hang on to anything that may be handy. The expectoration is always thick, and it may be yellow or white, sometimes streaked with black, especially in the winter. He has never brought up any blood,

with the exception of a mouthful now and then. He gets short of breath, especially on exertion, or after a bad fit of cough. His occupation is an unfavorable one, for he is engaged in heaving sacks of coal at the gas-works. He gets as hot as any man can get, he says, and then goes out or stands in a draught 'to cool down a bit.' This he thinks has tried his constitution. On examining the chest it was found that there was a little general emphysema, with sibilant rhonchus over the right front and back. Immediately the patient had been examined he was made to inhale a spray of equal parts of ipecacuanha wine and water. The Richardson's apparatus was employed, and the quantity of the diluted wine used was

FIG. 1.—Steam Atomizer for Ipecacuanha Spray.

5 c.c. The chest was then at once re-examined, and it was found that the sibilant rhonchus had entirely disappeared from the front and had almost gone from the back. After inhaling 10 c.c. more of the diluted wine the patient expectorated freely. At the expiration of five minutes, during which 35 c.c. had been sprayed, the abnormal signs had entirely disappeared from the chest. The patient came the next day, and had another inhalation of 40 c.c. This was repeated on six consecutive days, when the patient reported that he was quite well. The cough had left him; there was no expectoration, the breathing was easier, and his appetite had returned. On examining the chest no rhonchus was to be found."

The only objection to the treatment is that it involves a

daily visit from the patient, and necessitates the expenditure of a certain amount of time and trouble. It is much easier to write a prescription than to spray a patient; but this objection fortunately does not hold good in the out-patient room of a large hospital, where we have a number of clinical clerks at our disposal, who are not only skilled observers, but are always ready and willing to help. Only this winter, at the Westminster Hospital, a number of these cases had accumulated, and were making slow progress under various expectorant mixtures. The matter was looked into, notes were taken of their symptoms, a plan was organized by which they were made to come every morning to be sprayed by the clinical clerks, and in a fortnight the majority of them were practically cured, no medicine having been given meanwhile. Some of these cases were treated by the hand-ball spray; but after a time, to save trouble, a Siegle's steam spray apparatus was introduced, and it was found that half an hour in the morning sufficed for the treatment of a considerable number of patients. Not only do the patients get well much more quickly than when mixtures alone are given, but there is a considerable saving in drugs—a matter of no small importance in an hospital where treatment has to be conducted on principles of strict economy. If every hospital had in connection with its out-patient department a small room which could be devoted to the administration of drugs by inhalation, a still further saving might be effected, as the air could be rapidly impregnated with the drug, and one inhalation would suffice for a number of patients. I have sometimes ordered a small and inexpensive "fountain odorator" for patients who have been unable to attend oftener than once a week, but the spray is not so fine as with the steam apparatus, and the larger drops condense in the mouth and throat, and do not reach the finer air passages.

The mode of action of ipecacuanha in these cases is well understood. Expectorants may be divided into two classes—those which depress the heart, lessen blood-pressure, and increase secretion, and those which stimulate the heart, increase blood-pressure, and diminish secretion. Ipecacuanha belongs to the former category; but given in small doses, as in the form of spray, it exerts little or no depressing effect, but produces an abundant secretion from the bronchial mucous mem-

branes. It stimulates the activity of the respiratory apparatus in two ways—by increasing ciliary motion in the tracheal mucous membrane, and by acting on the respiratory centre. In post-mortem examinations made on animals which have been poisoned by ipecacuanha, it is found that there is intense hyperæmia of the lungs, which are in places emphysematous, but in other portions collapsed, and even affected with true consolidation. The influence of ipecacuanha in arresting bleeding is well known, and the presence of hæmoptysis is a special indication for its employment in the form of spray.

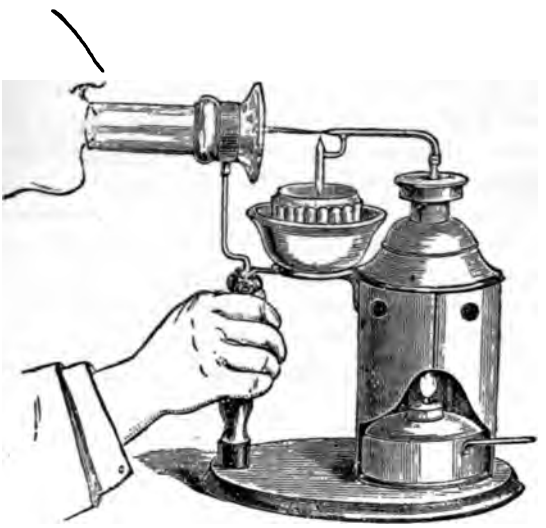

FIG. 2.—Another Form of Steam Atomizer.

When there is well-marked diathesis, the gouty for example, it will be necessary to counteract this before much benefit can be expected from the inhalation.

The following case illustrates two points—first, the necessity for treating a gouty diathesis when present, and, secondly, the possibility of the spray not being taken into the chest from arching of the tongue against the hard palate.

CASE IX.—"Mary E., a widow, and housekeeper to a gentleman, stated that she had a bad cough, with much expectoration and dyspnœa on exertion, every winter for eight years. She lived in a very cold house, and her master was

excessively penurious, and rarely indulged in fires. She came of a gouty family, and had had several bad attacks herself. She was a stout, little old lady, and must have weighed nearly sixteen stone. She was put on the usual ipecacuanha spray treatment, but after six inhalations, although the pure wine was employed, there was not the slightest improvement. She was then ordered tar, but after a fortnight's trial the cough and shortness of breath were as bad as ever. She then had a sharp attack of gout, for which she was treated vigorously with large doses of colchicum and iodide of potassium. This speedily gave relief to the more pressing symptoms, but her chest troubles were as bad as ever. The ipecacuanha spray was again essayed, and it was then noticed for the first time that she had a habit of pressing the tongue up against the palate, so as effectually to prevent the entrance of the vapor into the chest. She was told to hold her nose when inhaling, but this had not the desired effect; and finally she was induced to protrude her tongue as far as possible, the nozzle of the apparatus being introduced into her mouth. The spray was then administered without difficulty, and, after a few applications, we had the satisfaction of seeing a marked improvement in all her symptoms. It is probable that had we taken this precaution earlier, and given at the same time full doses of colchicum, she would have made a more speedy recovery."

In making these observations with ipecacuanha spray, it was noticed that, when hoarseness was a prominent symptom, the voice at once became clearer, and the patient was able to sing and speak, at all events for a time, without difficulty. Sometimes there was a relapse in a few hours, but after five or six inhalations the hoarseness usually disappeared. It was found that this condition usually depended on congestion of the vocal cords, which rapidly improved under the treatment. Many cases have been treated in this way, and the following may be taken as typical illustrations:

CASE X.—"George E., æt. 51, an engine inspector on one of the railways, came to the hospital on November 27th, complaining of hoarsenses. He had been quite well, he said, until about three weeks before, when he got wet through and had caught a bad cold. His voice had been gradually getting

weaker, and for some days he had been unable to speak above a whisper. He kept at his work, but could not talk much, and had, as far as possible, to convey his meaning by grunts and signs. He had never been ill before, and hardly knew what it was to have a cough. He was a big, fine fellow, but looked the picture of misery from his inability to speak. His chest was carefully examined, but nothing could be detected. On laryngoscopical examination, the vocal cords were found to be swollen and congested. He was at once given an inhalation of ipecacuanha wine—two drachms and a half—by means of a steam spray apparatus, and immediately his voice became clearer, and he could speak without much effort. He was unable to attend again until December 8th, when his voice was worse, and he could hardly speak at all. It appears that he had been to a smoking concert the night before, and could not resist the temptation of joining in the choruses. What between the smoke and the harmony, he was almost voiceless. On examination it was found that the left ventricular bands were greatly swollen. He was given another inhalation of ipecacuanha wine, four drachms being used this time, and at once, as on the previous occasion, his voice became clearer. The next day he came again, and after another inhalation of ipecacuanha wine a still further improvement was noticed. He was given no medicine, with the exception of a purgative pill. On the 11th he was given his third inhalation, four drachms again, and on leaving he declared that his voice was nearly restored. He took great pains to inhale thoroughly, and probably much of the ipecacuanha was absorbed. The next day he was still better, but reported that the spray made him sick. He had another inhalation, and did not return till the 22d, when he came to say that he was perfectly well and needed no further treatment. The vocal cords were examined and were found to be healthy. He was discharged cured after five inhalations."

In the next case hoarseness, depending on congestion and ulceration of the cords, was relieved by a course of the ipecacuanha spray:

CASE XI.—"Emma V., æt. 30, single, a children's nurse, came under observation on December 4th. She stated that

she had had a cough every winter since she was a girl at school. It troubled her most at night, and frequently disturbed her rest. It usually came on in fits, and she could obtain no relief until she had expectorated a quantity of thick phlegm. She had been more or less short of breath for three years, and often experienced considerable difficulty in getting up-stairs. There was a little loss of flesh in the winter, but nothing very much. She had never had sweating at night, and there was no family history of phthisis. Her general symptoms troubled her very little, but she was much alarmed at losing her voice a fortnight ago. She speaks now in a guttural tone, and evidently with considerable discomfort and distress. She attributes her symptoms partly at having to get out of bed at night to attend to the children, and partly to the fact that she has to sing to them, and also in a choir. On examining her chest she was found to have a little moist rhonchus at both bases. On laryngoscopical examination it was found that there was ulceration of the right cord, with congestion of both. She was given an inhalation of ipecacuanha wine by means of the steam inhaler, and an improvement in the voice was at once apparent. The improvement, however, was only temporary, and the next day she was as bad as ever. She had eleven inhalations before there was any improvement. Sometimes she had the spray from a Richardson's apparatus and sometimes from the Siegle's, but she preferred the latter. She was kept under treatment until December 29th, by which time her voice was perfectly clear, and all her symptoms had disappeared. At her last visit the chest was examined, and was found to be free from rhonchus, whilst the laryngoscope showed that the ulceration of the vocal cord had disappeared."

I have used a tartar emetic spray in a certain number of cases, chiefly with the view of comparing the results with those obtained with the ipecacuanha spray. I usually employ a solution of tartar emetic in water, one grain to the ounce. In some cases I have used equal parts of antimonial wine and water, and sometimes the antimonial wine undiluted. I have given it sometimes with the Richardson spray apparatus, and sometimes with the Siegle. The best results have been obtained when the expectoration has been thick and stringy,

and expelled with difficulty. Sometimes it produces nausea, but this can be avoided by using the diluted solution, and limiting the quantity. It certainly has less effect on the dyspnœa than the ipecacuanha wine. It is a useful mode of treatment; but, on the whole, I prefer the old ipecacuanha treatment.

The following is a simple case cured by four inhalations of tartar emetic, no other medicine being given:

CASE XII.—"Edward G., aged 45, is by occupation a sawyer. He works chiefly in hardwood, such as ebony and mahogany. All the men in the shop suffer more or less from the dust. Many of them die early of consumption or bronchitis. He could not wear a respirator when at work, as his mates would chaff him out of it. The general adoption of respirators would not be beneficial, he says, as the men would live longer, and wages would be lower. He has been fortunate, and this is the first winter he has had a really bad cough. He has had it now four months, but it does not matter much, as he still keeps to his work, and can eat and drink as much as ever. He would like to get rid of it, however, for his breath is short, and he cannot get about quite freely. He has spat streaks of blood at times, but never paid much attention to it. He is not married, and has no family. He knows nothing about his parents, and has not heard of them for years. On examining the chest, it is found that there is sibilant rhonchus all over both fronts. He is to take no medicine, but is to have the tartar emetic spray—one grain to the ounce of water—every morning. After the first inhalation, he reports that the cough is easier, but the shortness of breath is no better. After the second inhalation, the cough was said to be very much better, and there has been some improvement in the breathing. After the fourth inhalation, the cough had almost ceased, he could get about without much difficulty, and he did not see the use of wasting his time coming any more. He was given a tonic which he said he would take if he thought it necessary."

In the following case the tartar emetic and the ipecacuanha spray were used. The result was not very satisfactory, probably in consequence of the patient's constant exposure to cold:

CASE XIII.—"J. Smith, aged 40, a fireman at Euston, stated that he had had a terrible cough every year for six or seven years, chiefly in the winter months, for he was often exposed to wet, cold, and draught for ten or twelve hours at a stretch. The fogs affected him greatly, and the smoke and steam were almost as bad. Some days his breath was so short that he could hardly get about, but he managed to stick to his work, well or ill. The phlegm was thick, and hard to get up. Two of his sisters had died of consumption, or some kind of cough. On examining the chest, sibilant rhonchus was noted all over the front, with moist sounds at the bases posteriorly. He was given an inhalation of tartar emetic, two grains to the ounce, and he complained that it made him feel sick. He brought up a great deal of phlegm, which eased the cough. The uvula was found to be very long, and the application of glycerin of tannin eased him very much. The strength of the inhalant was reduced to one grain to the ounce, and there was no further complaint of sickness. After three inhalations, he said the cough was easier, and that the treatment had done him good. He stayed away for some days, and then returned, saying he had caught a fresh cold. The tartar emetic was used again and again, and afforded some relief. He had seven inhalations in all, when, as he was not making very marked progress, the ipecacuanha spray was substituted. This, he said, eased the breath more. He had six of the ipecacuanha inhalations, and, as there was still a good deal of rhonchus to be heard over the chest, he was well painted with iodine liniment, which afforded him material relief. He said he could not afford the time to come any more. He was discharged considerably better, but not cured."

In a few obstinate cases, in which shortness of breath has been the prominent symptom, I have employed a spray of tincture of lobelia with considerable success. The following case is of interest, as it illustrates the comparative benefit obtained in an obstinate case from sprays of tartar emetic, ipecacuanha wine, and tincture of lobelia:

CASE XIV.—"Thomas H., aged 57, has been a cab-driver for the last twenty years. He has had a cough for winters, and it is worse this year than usual. It comes on in bad fits

almost every hour, night and day. The expectoration is abundant, white, and frothy. His breath is so short that he cannot lie down at night, and he has the greatest difficulty in getting up-stairs. He cannot walk far, and, once on his box, he does not care to get off it. There is a good deal of emphysema, and the signs of bronchitis are well marked. He is gouty, and has had several sharp attacks. On 8th January, he had an inhalation of tartar emetic, two grains to the ounce, about four drachms being used. On the 9th, he reported that there had been no improvement, and the inhalation was repeated. On the 11th he came again, and said he thought he had been a little better after the inhalation, but he could not say positively. It was repeated, and the next day he said he was no better. The inhalation was given on the 12th, 13th, 14th, 15th, and 16th, and there was some improvement in the cough, but the breathing was as bad as ever. These were all fine, bright, warm days, and a better result was looked for, especially as the patient was staying at home, and was not out with his cab. The inhalation was repeated on the 18th and 19th. These were cold, damp, foggy days, and the patient was so short of breath that it was determined to give him the ipecacuanha spray in place of the tartar emetic. The ipecacuanha wine was diluted with an equal quantity of water, and of this four drachms were used in the hand-ball spray apparatus. He reported that there had been an improvement, the cough was easier, and the breathing especially was less distressed. This same inhalation was given daily for a week, and the patient continued to make very satisfactory progress, except that his breath was short, and he had great difficulty in getting about. The patient, being most anxious to get back to work again, it was determined, on the 27th, to give him lobelia spray. The simple, not the ethereal, tincture was used, and he was given 150 squeezes of the hand-ball spray apparatus. He did not seem to mind it in the least, but said it eased his breathing 'like tobacco smoke.' He coughed a good deal, and brought up more phlegm with less difficulty than he had done for a long time. On the 28th he had 200 squeezes, and, on the 29th 250, there being a very great improvement in the breathing each time. On the 1st, 2d, 3d, and 4th he had 260 squeezes, and seemed to be doing remarkably well, when he was seized with an attack of acute gout in

the left foot and wrist. He had nothing but colchicum for a week, and then returned with the breathing nearly as bad as ever. At his own request he had the lobelia spray daily for a week, and he again improved wonderfully. He felt well enough to go back to work, and on 4th March was given some tar pills and a tonic. He came from time to time till May, when he left us for the summer. It may be mentioned that he thought the lobelia did more good to his breathing than either of the other drugs used as sprays. He always 'felt better and easier for it.' At first it strained his chest, and he hardly felt strong enough to bear it; but, after a time, when he got used to it, it did more than anything to ease the spasm."

I have given the lobelia spray in a few cases of bronchial asthma with advantage. One of the patients (Case XVI.) was a little girl of seven, who, in addition to a good deal of cough, which was more or less persistent all the year round, suffered at times from true asthmatic attacks coming on suddenly and usually at night. The bad attacks came on at uncertain intervals, and she often went a fortnight without one. The pure tincture of lobelia was used, the patient having from 200 to 250 squeezes at each visit. The treatment was commenced on 29th January, and she had no attack until 9th February. It came on as usual at night, but it lasted only an hour, and passed off more quickly than she had anticipated. She continued the treatment until 24th March, and had only one slight attack during that time. On discontinuing the spray and substituting a tonic, the asthmatic attacks became more frequent.

The same method of treatment was adopted in the case (Case XVIII.) of a woman aged 73, who had had shortness of breath and cough for many years. The attacks usually came on at night, and the breathing was very short after any exertion. She had been so ill for many months that she had made no attempt to go out. In her case the tincture of lobelia was diluted with twice its bulk of water, and from 150 to 250 squeezes were given daily. It is unnecessary to give details of her case in full, but she came daily from 29th January until 12th February, and during that time gradually and steadily improved, both with respect to the cough and the breathing.

As the expression "200 squeezes" conveys no definite meaning, it may be as well to explain that with the apparatus employed 100 squeezes corresponded to a drachm of fluid. Three hundred squeezes of the mixture used in the last case (1 in 3) would, of course, mean a drachm of the tincture, but it must be remembered that only a portion of this really goes into the lungs or is absorbed, much of it being deposited in and about the mouth.

The observations with the lobelia spray are comparatively few, and I have notes of only about twenty cases, but I am inclined to think well of it and should recommend it in cases of asthma. It will be remembered that as a rule the ipecacuanha spray is not suitable for cases in which the asthmatic element predominates. These are just the conditions in which the lobelia does good.

In a few very obstinate cases of chronic bronchitis, and in three cases of phthisis, I used a spray of tincture of cantharides. The preparation I employed contained five minims to the drachm of water. It produced no irritation and seemed to do good by allaying the cough and facilitating expectoration. My experience of this mode of treatment has been so limited that I cannot take the responsibility of recommending it.

I have notes of about a dozen cases of winter cough in which I used tincture of jaborandi as a spray. The quantity employed at each inhalation was two drachms. In some cases it caused slight salivation and perspiration. It facilitated expectoration, but I am satisfied that the results obtained were not equal to those which followed the administration of the ipecacuanha spray. A great disadvantage was that the jaborandi stained the face, and although the stains washed off after a time, it was not pleasant for the patient. An old gentleman who came with a long snow-white beard went away with one of a bright green color. He did not notice it, but his friends did.

Another spray which I sometimes used in bronchial catarrh is a solution of iodide of potassium. It is well known that this drug is a useful addition to the ordinary chloride of ammonium expectorant mixture. For spraying I employ a two-per-cent aqueous solution. The results have been perfectly satisfactory in every way, and in many cases there has

been prompt relief to the dyspnœa. In a paper on "Paroxysmal Sneezing" by Dr. Ringer and myself ("British Medical Journal," June 16th and 23d, 1888), we related the case of a gentleman who always suffered from a peculiar itching at the back of the throat from taking iodide of potassium. He experienced the same symptoms from the use of a largely advertised remedy known as "Spirone." Acting on this hint, we had it analyzed, and found that it was practically a two-per-cent solution of iodide of potassium mixed with glycerin and acetone. Many cases in which I have employed iodide of potassium as a spray I have painted the chest with iodine. I prefer the liniment, taking care to apply it not only over the chest in front, but to the back as well. It smarts, of course, but it does good. It probably acts in two ways, first as a counter-irritant and then as an inhalation, the iodine, which is volatilized by the heat of the body, being inhaled in small quantities through the respiratory passages. It is a good accessory mode of treatment, and does not preclude the use of other remedies.

CHAPTER III.

TAR AND ITS ALLIES.

THE literature of tar as a remedial agent is extensive and exhaustive. The works of Axtius and of Roberg, which appeared respectively in 1679 and 1718, call for but a passing notice. The most solid contribution to the subject is the remarkable work by the Right Rev. Dr. George Berkeley, Lord Bishop of Cloyne, and author of the "Minute Philosopher," which he entitled "Siris: a Chain of Philosophical Reflections and Inquiries concerning the Virtues of Tar Water and divers other Subjects connected together and arising one from another." The first edition was published in 1744, and the second edition, "improved and corrected by the author," in, I think, the following year, although it bears no date on the title-page. It appeared first in Dublin, was reprinted in London, and was subsequently translated into French, German, Dutch, Swedish, and other languages. It created some sensation at the time, and gave rise to a great many other works on the same subject. It covers 176 closely-printed pages, and is divided into 368 sections. Copies of it are rare, but it is still occasionally to be met with on second-hand book-stalls both in London and Paris. The learned writer says: "In certain parts of America tar water is made by putting a quart of cold water to a quart of tar and stirring them well together in a vessel which is left standing till the tar sinks to the bottom. A glass of clear water being poured off for a draught is replaced by the same quantity of fresh water, the vessel being shaken and left to stand as before. And this is repeated for every glass so long as the tar continues to impregnate the water sufficiently, which will appear by the smell and the taste. But as this method produceth tar water of different degrees of strength, I choose to make it in the following manner: Pour a gallon of cold water on a quart of tar and stir and mix them thoroughly with a ladle or flat stick for the space of three or four

minutes, after which the vessel must stand eight-and-forty hours, that the tar may have time to subside, when the clear water is to be poured off and kept for use, no more being made from the same tar, which may still serve for common purposes." The author, after referring to its supposed virtues as a preventive of small-pox, continues: "Having tried it in a great variety of cases, I found it succeed beyond my hopes, in a tedious and painful ulceration of the bowels, in a consumptive cough (as appeared by expectorated pus), an ulcer of the lungs; in a pleurisy and peripneumony. And when a person, who for some years had been subject to erysipelatous fevers, perceived the usual forerunning symptoms to come on, I advised her to drink tar water, which prevented the erysipelas. I never knew anything so good for the stomach as tar water; it cures indigestion and gives a good appetite. It is an excellent medicine in an asthma. It imparts a kindly warmth and quick circulation to the juices without heating, and is therefore useful not only as a pectoral and balsamic, but also as a powerful and safe deobstruent in cachectic and hysteric cases. As it is both healing and diuretic, it is very good for the gravel. I believe it to be of great use in a dropsy, having known it cure a very bad anasarca in a person whose thirst, though very extraordinary, was in a short time removed by drinking of tar water."

This paper, by the author of the "Minute Philosopher," was followed by a number of pamphlets in reply to it, the best-known being "Anti-Siris, or English Wisdom Exemplify'd by various Examples, but particularly the present General Demand for Tar Water, on so unexceptional authority as that of a R——t R——d Itenerant Schemist and Graduate in Divinity and Metapisicks. In a letter from a Foreign Gentleman in London to his Friend abroad;" and "A Cure for the Epidemical Madness of Drinking Tar Water from Ireland, by a certain R——t R——d Doctor in a letter to his L—— P. By T. R. (? Thomas Reeve), M.D." This second production is usually attributed to Dr. Thomas Reeve, and is well worth reading. Bishop Berkeley in 1787 published "Two Letters on the Usefulness of Tar Water in the Plague," and this was followed some five years later by "Further Thoughts on Tar Water." Among other works which appeared about the same time may be mentioned Hale's "Account of some Ex-

periments and Observations on Tar Water," and the "Programma quo infusum Picis liquidæ aquosum declaratur" of Qualmalz.

In 1823 Sir Alexander Crichton published a work entitled "Practical Observations on the Treatment and Cure of Several Varieties of Pulmonary Consumption, and on the Effects of the Vapour of Boiling Tar in that Disease," in which he details some wonderfully good results obtained by treating patients suffering from pulmonary affections in "Tar Chambers." His directions for treatment are precise, and he points out that "tar as it comes to market is generally found to be contaminated with more or less pyroligneous acid, which fluid being very volatile is disengaged long before the tar boils, and as it is irritating or hurtful to the lungs must be got rid of or be arrested. For this reason the tar, before being brought into the bedroom of the sick, ought to be boiled for a few minutes in the open air, and then to every pound of it ought to be added from one to two ounces of the subcarbonate of potash." He says: "The simplest way of charging the apartment with the tar vapor is to put a pint or upward of the prepared tar into any flat dish of iron, copper or earthenware. This is to be placed on a stand about a foot from the ground so as to admit a suitable lamp under it. This apparatus must not be placed too near the patient at first, because it is impossible to say beforehand how it may affect him, and in what degree of force he can bear it. In whatever part of the apartment it is placed the air is soon charged with the vapor." He adds that "the tar to be employed ought always to be chosen as liquid as possible, and consequently the thick resinous part at the bottom of the casks ought to be rejected."

In 1860 Sales-Girons published a work of some five hundred pages, entitled "Traitement de la Phthisie Pulmonaire par l'inhalation des liquides pulvérisés et par les fumigations de Goudron," in which a similar mode of treating chronic bronchitic affections is advocated. The results seem to have here undoubtedly the germ of the antiseptic method of treating consumption which of late years has been employed with so much advantage.

In March, 1875, a paper "On the Value of Tar in Bronchial Catarrh and Winter Cough," by Dr. Ringer and myself, appeared in the "British Medical Journal." We were induced to

make an investigation of this mode of treatment, partly from the account of its efficacy which we had seen in the works already referred to, and partly from the description of its effects given us by patients who had lived in France and Belgium. People so susceptible to cold that they were obliged to remain in-doors the whole winter told us that this remedy curtailed considerably the duration and lessened the severity of their catarrhal attacks, and that by an occasional recourse to the tar they became less prone to catch cold, and could more freely expose themselves to the weather without incurring an attack. Our observations serve to confirm these statements.

We gave the tar in two-grain doses, made into pills, every three or four hours. We carefully watched its effects on twenty-five patients whose ages ranged from 34 to 70, the average being 44. All these patients had suffered for several years from winter cough, lasting the whole winter. They were all out-patients, and came to the hospital either once or twice a week. Most of them were much exposed to the weather, while some were so ill that they were obliged to give up their work, and were consequently less exposed. These patients suffered from the symptoms common in winter cough —paroxysmal and violent cough—the paroxysms lasting from two to ten minutes, and recurring ten to twelve times a day, and also at night, breaking their rest. The expectoration, frothy and slightly purulent, was generally rather abundant, amounting in some cases to half a pint or more in the day. The breathing was very short on exertion, but most of them could lie down at night without being propped up. The physical signs showed a variable amount of emphysema, with sonorous and sibilant rhonchus, and occasionally a little bubbling rhonchus at the base. These patients usually began to improve from the fourth to the seventh day, the improvement rapidly increased, and in about three weeks many of them were well enough to cease attending. The improvement was in many cases so decided that the patients returned to their work—even those who in previous years had been confined to the house the whole winter. The cough and expectoration improved before the breathing. In several cases the expectoration increased during the first three or four days, but it was expelled more readily; and, with the improvement in the cough and expectoration, strength and appetite returned. On

discontinuing the tar, a relapse often occurred in a week or two, and the patients returned with a request for some more of the same medicine; and then a second time the symptoms quickly subsided. We found it of little value in bronchial asthma, and its effects were more evident in cases where the expectoration and cough were more troublesome than the dyspnœa. We came to the conclusion that tar administered in this way was a good, useful, though perhaps not a striking remedy for these bronchitic affections, and that it was certainly more efficacious than the drugs usually employed.

This communication excited a good deal of comment; and in the following May, in consequence of the numerous inquiries we received respecting the best method of administering the drug, I published a supplementary article on the subject. It was pointed out that the drug used was not pitch, as many of our correspondents had supposed, but the wood tar, the Pix liquida of the British and United States Pharmacopœias, prepared from the wood of Pinus sylvestris, the Scotch fir, and other pines, by destructive distillation. In America the Pinus palustris of the Southern States is preferred; but that is a mere matter of detail. The wood is cut into billets of a convenient size, which are heaped up so as to form a large stack or pile, and then covered with earth, as in the process of making charcoal. The stack is built up upon a small circular mound of earth, higher at the circumference than in the centre, where there is a hole communicating by a conduit or outlet with a shallow ditch surrounding the mound. A light is applied at the top, and the whole mass is allowed to burn slowly, so that the resinous matter is melted out of it by the heat. The tar runs into the hole in the centre of the mound, and passes along the conduit into the ditch, from which it is transferred to barrels. Immense quantities are made in North Carolina and Virginia: enough to tar all the rails in the States, and cure the coughs of the world besides.

At first our pills were made with massa panis, prepared as follows: "Wheaten flour, one part; glycerin, five parts, by weight: mix and heat together until a jelly is formed; when cold, add six parts of wheaten flour; and beat well together." This, although a good formula for many pills, does not answer well for tar. We next tried mixing the two grains of tar by means of gently heating with a grain of wax and

two grains of powdered liquorice root. This was more satisfactory, but the difficulty was that these pills could not be coated, as the spirit used in the process dissolved out the tar. Subsequently, the pills were made by a much simpler method: by mixing with the tar half its weight of lycopodium, the sporules of Lycopodium clavatum, and other allied species.

For some years, however, I have prescribed tar in the form of perles or capsules. The perles contain from two to three grains in each, and two may be taken as a dose. The large capsules hold from four to five grains, although they vary somewhat in size. There are several other preparations containing this drug, which are largely used on the continent, and might perhaps with advantage be introduced into this country. For example, the "Dragées de Christiania au Goudron de Norvège" are elegant little bon-bons, each containing five grains.

The worst of these elegant preparations is that they are too expensive to use in hospital practice. For a long time I could find no good way of giving tar—no method, that is to say, that exactly suited my requirements—but at last I thought of the syrup of tar of the United States Pharmacopœia, and for the last two years I have used very little else. I published the formula in the "British Medical Journal" of March 3d, 1888. It is as follows:

"Tar, three ounces; cold water, five ounces; boiling distilled water, twenty ounces; sugar, in coarse powder, twenty-eight ounces. These are the quantities required to make two pints. The cold water is poured on the tar, and it is shaken up frequently for twenty-four hours, and then the water is thrown away. The boiling water is then thrown on the washed tar, and the mixture is stirred briskly for fifteen minutes, after which it is allowed to stand, with occasional stirring, for thirty-six hours. The solution is then decanted and filtered. Finally, in seventeen ounces of the tar water dissolve the sugar, and mix it all up together."

This seems a somewhat complex process, but the directions should be strictly followed. The preliminary washing with cold water is absolutely necessary, as it gets rid of the acid principles which would prove irritating. It is a most inexpensive medicine, costing practically nothing but the trouble of making. It is prescribed as Syrupus Picis Liquidæ or Sirop

de Goudron. It is generally said to contain four per cent of tar, but Mr. Tanner, the Dispenser at the Westminster Hospital, tells me that it is very difficult to say exactly how much there is taken up, as, from the addition of the water, the tar weighs after the process almost as much as it did before. He finds, however, that, by the addition of a few drops of some alkali—such as ammonia, for example, which is rather beneficial than otherwise—he can make it of almost any desired strength. It is probably not a simple body, but contains xylol, creosote, pseudo-cumol, chrysene, retene, methyl-creosote, and other substances, the names of which cannot be pronounced without danger to the health. The great point about it is that it is palatable, and that it is taken by patients, who have no misgiving as to its composition, without difficulty. I usually give it in two teaspoonful doses, in a little water, four times a day; or, better still, a couple of teaspoonfuls may be taken as a cough linctus any time, night or day, when the cough is troublesome. Of course, there are always people who are fastidious, and object to the taste of any medicine. In the case of these hypercritical individuals, I mix it with a little syrup of wild cherry, made as follows:

Wild cherry bark in fine powder, five and a half ounces; sugar in coarse powder, twenty-eight ounces; glycerin, two ounces; water, a sufficient quantity to make two pints. The wild cherry is thoroughly moistened with water and macerated for twenty-four hours in a closed vessel. It is then packed firmly in a cylindrical glass percolator, and water is gradually poured upon it until fifteen fluid ounces of percolate is obtained. The sugar is then dissolved in the liquid by agitation without heat, the glycerin is added, and the process is complete.

A mixture of two parts of syrup of tar and one part of syrup of Virginian prune is an ideal mixture. In its presence maraschino, curaçoa, and even green chartreuse naturally take a back seat. I cannot say more in favor of a cough medicine, except that its effects are really marvellous and that the chronic bronchitic who has once tasted it yearns for it. This is no hypothetical statement, for during the last two years I have prescribed it for over a hundred patients. Sometimes in very bad cases I ordered two pills containing two grains of tar in each to be taken every three hours with

a tablespoonful of the syrup to follow as a relish. I see no objection to the addition of three minims of liquor morphinæ acetatis to each dose of the syrup when the cough is very troublesome, or even of ten drops of tinctura camphoræ composita. When expectoration is difficult the addition of a little apomorphine will be found most useful. I use the two-per-cent solution of the British Pharmacopœia, the injectio apomorphinæ hypodermica, as it is called. It is perhaps unnecessary to say that it need not be freshly prepared, and that the change of color which it undergoes on keeping is of not the slightest importance. I find that six minims may be given frequently without exciting nausea, and that many patients take ten without difficulty. It is a wonderful expectorant and its beneficial effects are far too rarely evoked in this country.

I have notes of a large number of cases which have been treated with tar—notes which have accumulated little by little during the last ten years, but nothing would be gained by reproducing them in detail, and it will suffice if I mention some half-dozen which serve to illustrate points of interest.

The first is a simple uncomplicated case of no great duration in which a cure was soon effected:

CASE I.—"Harriet H., aged 47, keeps house for her husband, but was formerly in the green-grocery line, and for the best part of her life served in an open shop. She had suffered from a bad cough for five or six years, but this winter it is worse than ever. It comes on in severe paroxysms, a dozen or more in a day, each lasting ten minutes or longer. It is always increased by fog or smoke, and her husband has to go out into the back yard if he wants to smoke when he comes home. The expectoration is profuse, white, and frothy. There has never been any hæmoptysis. Her breath is short, and she has much difficulty in getting up-stairs. On examining the chest it was found that there was bubbling rhonchus at the bases of both lungs. On January 8th the patient was ordered two-grain tar pills, to be taken every four hours. On the 15th she reported that she was much better, and that the paroxysms of cough were less frequent and of shorter duration. On the 22d she stated that the breathing was better, thanks to the pills, and she had improved in every way. On the 29th the cough had left her and the expectoration had ceased. She was given a tonic and ceased attending."

The next is an exceptionally obstinate case in which the tar had to be taken without intermission for two months:

CASE II.—"Sophia H. came to the hospital complaining that she had had a cough for fourteen years. It always came on early in November and lasted until the summer was well advanced. The fits of coughing were very severe, and she had them almost every hour. There was always a good deal of expectoration, sometimes watery and sometimes yellow and thick, so as to necessitate the use of three or four pocket handkerchiefs both night and day. There was great shortness of breath, and the patient had difficulty in walking even half a mile. It was impossible for her to get up-stairs, so that she was obliged to have a bedroom on the ground floor. She complained that she had no appetite, and that she felt low-spirited, weak, and ill. Her father and mother had both died of consumption, and all her brothers and sisters suffered from winter cough. On examining the chest it was found that the percussion note was poor, and that the movements were impaired, but there was no actual proof of the existence of consumption. On November 13th she was ordered two grains of tar in a pill, to be taken every four hours. On the 20th she reported that the cough was easier and that she had slept better. On the 24th the expectoration was less, and the breathing was easier. On the 27th she caught a fresh cold from incautious exposure to night air and fog, and there was relapse. On December 1st she was better again, and volunteered the statement that the pills greatly relieved the urgent symptoms. During the whole of this month she continued steadily with the treatment, and on January 11th it was found that she was almost free from cough, and that the expectoration had practically ceased, and that the breathing was quite as easy as it was in the summer. She was then given cod-liver oil and hypophosphite of lime, and was discharged cured."

The following is a good case in a bad subject:

CASE III.—"John R., æt. 66, a wheelwright, has had a cough in the winter for many years. He has had a very bad attack of it this year and expectorates a great deal of thick yellow phlegm. His breath is very bad; he roars, he says,

like a bull going up-stairs; and he cannot lie down at night, but has to sit up in an arm-chair. He cannot work, and for the matter of that has not done much for some years. His appetite is bad, but he can drink as well as ever, and does not care much what he takes if he can get it. He knows nothing about his family history, and never heard that he had any parents. He never had any previous illness, and never met with any accident except being locked up by the police. He is found to have sibilant rhonchus all over the front of the chest, with moist râles at the bases, but objects to the examination on principle as he cannot see the use of it. His arteries are degenerated and he has a marked arcus senilis. He is not a favorable subject for treatment, and it is doubtful if he will take any medicine. He is ordered two grains of tar in a pill four times a day, and at the expiration of a week returns and says he is no better and does not expect to be. The tar is repeated, and a week later he reluctantly confesses that his cough is easier, that he expectorates less, and that he can lie down at night without being troubled with the shortness of breath. He takes the pills for a fortnight longer, and then complains that he is so much better that if he goes on improving at the same rate he will be taken off his club and have to go to work again. The only good point about the pills, he says, is that they don't impair the powers of drinking. He is discharged evidently greatly dissatisfied with the treatment."

The following is a case of winter cough treated with syrup of tar and apomorphine given in steadily increased doses:

CASE IV.—"Daniel M., aged 46, a carpenter, came to the Westminster Hospital on November 25th, complaining of winter cough, from which he stated that he had suffered many years. It always came on early in November, and lasted the winter through. It troubled him more or less all day, but was worse at night. His expectoration was thick, copious, and tenacious. He was so short of breath that he was quite unable to work. The physical signs were those of emphysema, with moist rhonchus at the bases of both lungs. He was ordered a mixture of senega and ammonia, which did him little or no good. On December 14th the prescription was changed to syrup of tar, two drachms every four hours, and there was

an immediate improvement, especially as regards the cough. On December 21st the dose of the tar was increased to four drachms, with three drops of the apomorphine solution in each dose. The improvement was still more marked, and the patient expectorated with much less fatigue or difficulty. He was instructed to take the medicine every alternate hour, and this he did without inconvenience. On January 25th the dose of apomorphine was increased to five minims, and in February 8th to eight minims, the frequency of administration remaining the same. The symptoms were at once alleviated, and a week later the patient was discharged, practically cured."

In the following case, which threatened to prove obstinate, the tar pills and ipecacuanha spray were used concurrently:

CASE V.—"William B., aged 44, a bricklayer, states that he has had a cough from his birth, chiefly in winter, and that it gets worse every year as he grows older. It comes on in regular fits ten or twelve times, which take his breath away and prevent him from doing anything. The expectoration is frothy, and he spits up a pint or more during the night and day. His breath is always short, and he wheezes so much that neither he nor his wife can sleep at night. He can't lie down, and often feels as if he must be choked. He is always worse after meals, and the breath is especially short when the bowels are confined. On examining the chest, it is found that there is sibilant rhonchus all over both back and front, and there is dulness at the right apex, but without crepitation. He states that his father and one sister died of consumption, and that his mother, who is now 70, has been asthmatic for many years. He is ordered a pill containing three grains of calomel, with a little extract of hyoscyamus, to take every three hours, and he is instructed to come every morning to have the ipecacuanha spray. The treatment is carried out strictly, and at the expiration of ten days he reports that nearly all his symptoms have left him and that he is better than he has been in the winter for years. On examining the chest, it is found that the sibilant rhonchus has gone, and that the only sign of mischief is the dulness at the right apex. He is ordered some extract of malt and a mixture of hypophosphites of lime and soda, and a fortnight later he is discharged well."

In the following case the tar cured not only the winter cough, but psoriasis, from which the patient had suffered for many years:

CASE VI.—"Henry B., aged 66, a tin-plate worker, came to the hospital complaining of a cough, which he stated had troubled him every winter for six years. The paroxysms were very violent, and he had as many as twenty in a day, each lasting five minutes or more. He expectorated freely, the phlegm being sometimes frothy, and at others thick and yellow. He said he was very short of breath, and had often to stop a dozen times in walking a mile. He attributed his illness to working in a hot shop and then standing in a draught to get cool, a custom which he had followed for many years. He had lost flesh considerably; and, on examination, it was found that there was large bubbling rhonchus all over both sides of the chest and back. His arms and legs were almost covered with large patches of psoriasis, from which he had suffered for nearly ten years. He was obviously a good subject for the tar treatment, and he was ordered two two-grain tar pills every three hours to be taken for a fortnight. At the expiration of that time he returned and said that both the cough and the rash were completely cured."

The next is a very exceptional case, which is mentioned rather as a clinical curiosity than from any direct bearing on the case:

CASE VII.—"F. H., a cabinetmaker, aged 47, came to the hospital on December 1st, complaining of cough, from which he had suffered on and off for about two months. He stated that he had had it four winters, but was always well during the summer. The cough was paroxysmal, and he usually had two attacks during the night and a dozen or more during the day. The paroxysms were violent, and usually lasted from three to five minutes. There was a great deal of white frothy expectoration, which he expelled without difficulty. His breathing was short, and at times he could hardly get about. He had never spat blood, and there was no consumption in the family. His chest was carefully examined, but nothing wrong was detected. His urine was free from albumin. He stated—and this was the peculiar feature of his case—that

after a severe attack of cough he frequently lost consciousness for some minutes. He fell down, he said, quite insensible, and had been told that he was convulsed. The fits came on at various intervals, sometimes only once or twice in five or six days. They never occurred after a violent paroxysm of cough, but they were always preceded by a little cough. His memory, he pleaded, was very bad, and he might not be strictly accurate in his statements. Considerable doubt was experienced as to the nature of the fits, but the most probable explanation seemed to be that he was an epileptic. He was given bromide of potassium, which he took for ten days, but without benefit, the attacks being as frequent as ever. He was kept under observation as much as was possible in the case of an out-patient, but he was never seen in one of his attacks. There was no reason to think that he was intentionally misleading us, although it must be admitted that the circumstances were suspicious. He was ordered two grains of tar every three hours, with occasionally the ipecacuanha spray. As his cough improved, the fits became less frequent. He came twice a week for about two months, and careful notes were taken at each visit. The records are voluminous; but as considerable doubt existed as to the exact nature of his case, it is unnecessary to reproduce them in detail. The following summary will give some idea as to his progress:

TAKING TAR.

From December	11th to 14th, or 3 days,	3 or 4 fits.
" "	14th to 21st, or 7 days,	2 to 3 fits.
" "	21st to 29th, or 8 days,	no fit.

TREATMENT DISCONTINUED.

From December	29th to January 4th, or 6 days,	6 fits.

TAR RESUMED.

From January	4th to 6th, or 2 days,	9 fits.
" "	6th to 14th, or 8 days,	4 fits.
" "	14th to 20th, or 6 days,	no fit.
" "	20th to 25th, or 5 days,	2 fits.
" "	25th to February 2d, or 8 days,	1 fit (slight).

His cough was then cured, the expectoration had ceased, and the breathing was easier. He was seen at intervals, but

stated that there had been no return of the fits. It must be admitted that the whole case is open to considerable suspicion, and it is doubtful if much reliance can be placed on his statements. The curious circumstance was that he never had a fit at the hospital. He stated that he had had these attacks in previous winters when he was troubled with the cough, but never in the summer."

Tar, although a good remedy for winter cough, is somewhat slower in its action than the ipecacuanha spray. When shortness of breath is the prominent symptom the spray is clearly indicated, but if the cough is the predominant feature recourse may be had to the tar. The tar treatment, of course, involves much less trouble than the spray treatment. There is no reason why they should not be combined. The tar pills may be taken three times a day, when the patient is out and about, and the ipecacuanha spray used night and morning. It is somewhat difficult to give the ipecacuanha spray to children, but they take syrup of tar in unlimited quantities without difficulty.

In the United States a wine of tar is made according to the following formula:

"Tar, 8 fluid ounces; lager beer, 8 pints; alcohol, 8 fluid ounces. Boil the tar with the beer for fifteen minutes, allow it to cool, add the alcohol, and filter."

I am assured that gallons and gallons of this mixture are sold every winter, and that there is a constant demand for it all over the States. I have tasted it, but I cannot say I like it. I have no doubt that it is useful, and that in country districts it would be readily taken when perhaps more expensive preparations might not be appreciated. A more palatable preparation is made by allowing extract of malt to ferment in contact with tar; the alcohol acts as a solvent, while the extract of malt serves to sweeten the solution. Recently my attention has been called to an American medicine called Blount's "Aromatic Oil of Tar." It is palatable, and undoubtedly does good in many cases. Mr. Tanner finds that a similar preparation may be made by mixing tar with rum and a little treacle. It gives excellent results when administered freely.

Allied in general action to tar is creosote. I have used it,

not systematically, but from time to time, in a great number of cases of chronic bronchitis. I usually prescribe it in the form of a mixture, containing one minim of creosote, two of laudanum, fifteen of chloric ether, glycerin a drachm, and water to an ounce. This is given three or four times a day, according to the severity of the symptoms. I occasionally employ it in the form of a linctus made up with glycerin, and containing one drop of the creosote in the dose. If given frequently it eases the cough and facilitates expectoration. I usually resort to creosote when the patient complains of vomiting in addition to the other symptoms.

In connection with this subject I may mention that benzol is an excellent expectorant, and is a very useful remedy in the treatment of chronic bronchitis. It was originally made by distilling benzoic acid with lime, and was subsequently discovered by Faraday as a constituent of coal-gas tar. It is now obtained and purified by a somewhat complex method, which will be found described in most of the text-books on chemistry. It is a colorless, oily fluid, possessing an odor which to most people is not disagreeable. The formula I employ is the following:

Pure benzol, ...	1½ drachm.
Oil of peppermint, ...	½ "
Olive oil, ...	to 2 ounces.

The dose is from ten to thirty drops on sugar frequently. I have treated many cases of chronic bronchitis in this way, and the results have been very satisfactory. The dose of the rectified benzol may be increased if thought desirable.

The following is a brief note of a case of chronic bronchitis treated with benzol, and recently under observation:

CASE VIII.—"Emma N., aged 42, is a shirt-sewer by occupation. She is overworked and badly fed, and has had a cough more or less, both winter and summer, for the last five or six years. It is worse at night, and frequently she gets hardly any sleep. The expectoration is scanty, and is often streaked with blood. There is great shortness of breath, and the patient has much difficulty in getting about. She is losing flesh a little, but not to a very notable extent. On examining the chest it was found that there was loud bubbling rhonchus

all over both back and front. She was ordered ten drops of the benzol mixture on sugar every four hours, and a week later she reported that she was much better. The treatment was continued for a fortnight longer, and the cough had then almost disappeared; but there was still very great shortness of breath on exertion."

CHAPTER IV.

PURE TEREBENE AND ITS ALLIES.

THE next subject investigated was pure terebene. It is a clear, colorless fluid, having an aromatic odor, and it is made by the action of sulphuric acid on oil of turpentine and subsequent distillation. My observations with this drug were commenced in 1880, and in a lecture delivered at the Westminster Hospital I gave an account of the "Influence of Pure Terebene on Fermentation." It is not pretended that the experiments are complete or exhaustive, but they served my purpose, and put me in possession of certain information which I was anxious to obtain before making a clinical trial of what I hoped would be a valuable remedy. I took two beakers of the same size and shape, and in each of them placed 265 cubic centimetres of water and a little hay. To one of them I added half a cubic centimetre of pure terebene. Both beakers were covered with glass plates, and placed in a warm chamber at 36° C. (96.8° Fahr.). Two days later the test beaker was examined, and the fluid was found to be swarming with moving particles, so minute that they could with difficulty be seen with a Zeiss D. The other beaker smelt strongly of pure terebene, but nothing moving could be detected when examined with the same lens. On the ninth day from the commencement of the observation the hay infusion was turbid; a film had formed on the surface, and the fluid was distinctly offensive. Under the Zeiss D numerous monads were seen, with large numbers of moving organisms. The other beaker was clear; there was no film on the surface, the slight sweet smell of pure terebene was still perceptible, and moving organisms and monads were absent. On the eleventh day the temperature of the warm chamber was somewhat higher, having risen to 40° C. (104° Fahr.). The specimens being again examined under the Zeiss and a Ross's eighth, the field of No. 1 was found to be covered with moving organisms, but in No. 2 nothing was to be seen

on most careful examination. The test is a rough one, but it is clear that a two-per-cent solution of pure terebene will arrest fermentation in hay infusions.

On a subsequent occasion the experiment was repeated with one part in a thousand of pure terebene, the infusion being kept at this time at a temperature of 20° C. (68° Fahr.). In fifty-one hours the test solution, examined with a one-twelfth Ross's objective, was found to contain hay bacilli in large quantities in motion, and also numerous paramæcia. The solution with the terebene was not absolutely free from moving organisms, but they were fewer and less developed, and no paramæcia were found. At the expiration of seventy-five hours No. 1 was seen to be swarming with paramæcia and hay bacilli, breaking up into spores; No. 2 contained only a few moving organisms, and no paramæcia. Two days later No. 2 was swarming with paramæcia, while they had all disappeared from No. 1.

The influence of pure terebene on paramæcia was demonstrated in another way. A specimen of hay infusion swarming with paramæcia was put under the microscope and examined with a Ross's twelfth. Several large specimens being under observation, a drop of pure terebene was placed at the edge of the cover glass, and drawn through with blotting-paper. The paramæcia were at first but little affected, but after a time their movements almost ceased, although their cilia could still be seen languidly beating. A drop of water was then drawn through, and almost immediately the paramæcia became as active in their movements as ever.

Pure terebene has the power of arresting or preventing the fermentation of yeast. Two small bottles of identical size and shape were filled with a mixture of saccharine urine and yeast. To one bottle was added pure terebene in the proportion of one to four hundred and fifty. The bottles were inverted in the ordinary way in a flat vessel containing water, and placed in the warm chamber. In forty-eight hours fermentation had taken place in one bottle, and all the fluid had been driven out, while the bottle to which the pure terebene had been added remained full. On the third day a few small bubbles of gas appeared in it, and on the seventeenth day it contained only about one-fourth gas. The effect of pure terebene in this experiment was very marked. On another occa-

sion two bottles were taken, each holding 6½ ounces. In each was placed half an ounce of cane-sugar syrup, mixed with a little yeast. One was filled with water, the other with water containing 1 in 1,000 of pure terebene, and both were inverted in shallow dishes containing water, and placed in a warm chamber. The bottles were observed day by day for six days, and the carbonic acid gas was found to accumulate twice as quickly in the former as in the latter. On another occasion, two specimens were treated in a similar manner; and, at the expiration of fifty-one hours, both were examined microscopically. There was not much difference in the character of the torulæ, but those in the bottle containing the pure terebene were less developed.

Pure terebene undoubtedly exerts an influence on lactic acid fermentation. Two beakers were taken, each containing 250 cubic centimetres of fresh milk. To one of them was added five cubic centimetres of pure terebene, and both were placed in a warm chamber at a temperature of 40° C. (107.6° Fahr.). At the expiration of twenty-four hours they were examined. The milk in one was found to be curdled and strongly acid. That in the beaker containing pure terebene had a slight film on the surface, but was quite fresh, and was neutral in reaction. It was sweet and pleasant to the taste, the only odor perceived being that of the pure terebene, the greater part of which was found floating at the top. Twenty-three hours later this milk was curdled, and had strong acid reaction.

These observations led to a trial of the drug in cases of irregular fermentation in the stomach, acidity, flatulence, etc., and its subsequent introduction as a remedy for winter cough. The results of the clinical trials were not published until an interval of five years had been allowed to elapse, so that they might be amply confirmed.

In the "British Medical Journal," of 12th December, 1885, I published a paper on "Pure Terebene in the Treatment of Winter Cough," giving the results of 114 cases treated with this drug. It was administered in doses of ten drops three times a day; and, in addition, it was sometimes employed as an inhalation, either a spray apparatus or an atomizer being employed. The following is a fair average case taken quite at random:

CASE I.—"R. N., aged 43, a commercial traveller, had been subject to cough every winter for twelve years. His work, he said, was against him, and he was a good deal exposed to wet and cold and the inclemency of the weather. His cough used to trouble him badly only in the winter, but year by year it seemed to be coming on earlier, and now he was hardly ever free from it. It came on in fits, which shook him to pieces, and it was always very bad the first thing in the morning, often making him retch and vomit. There was a great deal of phlegm, thick and yellow when he was in the country, but speckled all over with black when he was in London. It was difficult to get up unless he could get some hot tea, or something to loosen it. The shortness of breath was worse than all, for it prevented him going about, and interfered with his business. He had never spat any blood worth speaking of, but there were at times streaks after a severe bout of coughing. He was not getting thinner, on the whole, but generally lost a little flesh in the winter, and picked up again in the summer. He had had a great deal of treatment, and mixtures, lozenges, and liniments without end. On examining the chest, it was found to be emphysematous, and there was loud bubbling rhonchus at the base of each lung. On 1st November he was ordered ten drops of pure terebene on a piece of sugar every four hours. Three days later, he returned, and said there had been a marked improvement; the cough was easier, the phlegm was lighter in color and not so thick, and the breathing was decidedly better. The dose was increased to twenty minims every four hours, and a week later the patient wrote to say that he was better, and was almost able to do without the medicine. I saw nothing of him again until 6th January, when, being in town, he came to see me. There had been some return of the old symptoms, and he was anxious for further treatment. I ordered him a small spray diffuser, holding about an ounce, and told him to use it with the pure terebene as an inhalation several times a day. A fortnight later he wrote saying he had bought a larger apparatus, and that his complaint was more amenable to treatment than it had been before. The terebene spray eased the cough, brought up the phlegm, and, above all, relieved the shortness of breath. On his long railway journeys, when he was unable to use the spray without inconvenience to his

fellow-travellers, he rubbed the pure terebene on his mustache and beard, so that it might slowly diffuse, and, as he said, 'soften the atmosphere.'"

One of the advantages of pure terebene is that it is not a bulky medicine. An ounce bottle is easily carried in the pocket, is always ready for use, and will last for days. It is best to begin with five or six drops on sugar every four hours, and gradually increase the dose to twenty minims. This, for most people, is the maximum quantity, but the drug has little or no toxic action, and one patient was so enraptured with his remedy that he insisted on taking a teaspoonful every four hours for a week. The only disadvantage I have ever noticed in it is that it gives a peculiar and characteristic odor of violets to the urine, a circumstance which patients never fail to mention. It has been said, exceptionally, to produce a rash on the skin, but that may be taken as an indication that it is not pure, and that it is contaminated with turpentine. When used as a spray, from one to two ounces should be diffused, and inhaled every week. In some instances, I have tried giving it mixed with an equal quantity of olive oil, flavored with oil of peppermint. In twenty-five cases I gave it as an emulsion made by mixing it with a little tragacanth powder, adding water, and shaking well. Each ounce of the emulsion contained a drachm, and it was usually given in half-ounce doses four times a day. The results were excellent, but not better than with the simple drug, and I saw no reason for continuing the use of a more expensive preparation. The same remarks apply to the various lozenges, capsules, and other forms for the administration of pure terebene, now so extensively sold. In every case of winter cough in which the pure terebene spray was used systematically, there was a marked improvement. In many instances it was noticed almost immmediately, but in other cases, especially the very chronic ones, the patient had to continue his remedy for some weeks. Even when there was marked emphysema with little movement of the chest walls, some benefit was experienced.

I treated eighteen cases of phthisis by the same method, and the results were certainly most encouraging. It did most good when there was old consolidation, when no active mischief was in progress, and especially when there was no eleva-

tion of temperature. I have also used it as a dry antiseptic inhalation on the cotton-wool of a respirator in phthisis, and have been much pleased with the results. In one case, that of a young lady, the respirator—a zinc one, which cost only sixpence—was worn almost continuously night and day for nine months, and the right lung, which was breaking down, cleared up, the temperature becoming normal, and the cough and other symptoms subsiding. Pure terebene, used as an inhalation, is also useful in checking hemorrhage from the lungs.

Many sufferers from winter cough also complain of acidity and flatulence. I soon found that pure terebene given internally was an excellent remedy for this combination of symptoms. It checks the formation of flatus so quickly, and is so efficacious in expelling any that may remain in the stomach or intestines, that I constantly prescribe it in cases of dyspepsia, when flatulence is a prominent symptom. Patients like it, and often continue taking it for months or years. It acts as an antiseptic, probably in much the same way as glycerin, oil of cajeput, and oil of eucalyptus. It is now very largely used in the treatment of this common complaint.

The publication of my paper on pure terebene brought me letters from medical men in all parts of the country, many of them giving detailed accounts of patients under their care who had suffered from winter cough and had been treated with this drug. I tabulated the results so obtained, and found that, of the ninety-four additional cases, a distinct success was recorded in eighty-one. In six of the cases of failure a further investigation showed that there had been an incomplete diagnosis, the patient suffering from some complication, such as aneurism or aortic disease, the existence of which had not previously been suspected. In ten cases the patients complained of nausea after taking the medicine; and in several instances, when inhaled from lint, it excited the cough and apparently acted as an irritant. The explanation in all probability is, that at that time much of the pure terebene sold was of inferior quality, and might, with a closer approach to accuracy, have been described as "impure" terebene. Medicines, as a rule, do not improve with keeping, but pure terebene is certainly an exception, for as it gets old it becomes bland and oily. When the old stock, much of which had been in the

chemists' shops for years, was exhausted in consequence of the sudden demand, a new and crude pure terebene was substituted, many specimens being extremely irritating and quite unfit for internal administration.

A few months later an inquiry into the value of pure terebene as a therapeutic agent was undertaken by the Collective Investigation Committee of the British Medical Association, and much valuable information on the subject was obtained. The results were, in the main, confirmatory of the statements already made.

Surgeon-Major Wallick has pointed out that the flavor of pure terebene is very similar to that of the fruit of the mango, and suggests that a principle might be extracted from it which would be of use in the treatment of bronchitis. I obtained a small supply of the fresh fruit from India, and gave it to some of my bronchitic patients, who were pleased with it. I was unable to make any very accurate observations, as there was not enough for the purpose. I sometimes prescribe mango chutney, which is readily procurable in London; but I am hardly prepared to say that it possesses any very decided therapeutic action. Dr. Wallick's suggestion is a good one, and it is well worth the attention of sufferers in India and South America, where an abundant supply can be obtained. There was at one time an idea of making a "mango-terebene," but it has not yet been worked out practically.

To prevent any misconception, I may state that there is now not the slightest difficulty in obtaining pure terebene, in unlimited quantities and of exceptionable purity. There seemed to be an idea that I obtained my drug from some special source, but such was not the case. My observations were made chiefly at the hospital, and the supply was obtained by the dispenser in the usual way, and without any instructions from me. When I prescribed it in private practice I simply took care to see for myself that the drug supplied was of good quality. There are no "proprietary rights" in the manufacture of pure terebene, and any one can make it without let or hindrance. The point to remember, in testing it, is that it should be optically inactive, deflecting the ray neither to the right nor to the left. The consumption of pure terebene, as a therapeutic agent, is considerable, and many patients take it month after month in large doses. It is used quite as

largely for flatulence as for winter cough. It is often sold, as I have said, in the form of lozenges, tablets, and capsules, but I prefer the pure drug. Sometimes I hear that it has disagreed with a patient, or has perhaps brought out a rash; but, on investigation, it usually turns out that the drug employed was not the pure terebene at all, but an impure product suitable only for disinfecting purposes.

I have already quoted a typical case of chronic bronchitis treated with pure terebene, and, although there are some dozens of similar cases in my note-books, it would, I think, serve no useful purpose to reproduce them. I should like, however, to refer to a case in which large doses of the drug were taken with benefit:

CASE II.—"F. Z., aged 33, came to the hospital, on the 25th of November, complaining of a very bad cough. He had had it, he said, for many years, but was, as a rule, free from it in the summer. There was not much expectoration, and what there was came up without difficulty. The breathing was short, especially on exertion, and he had some difficulty in lying down at night. He was a native of London, and attributed his sufferings to the fogs. On examining the chest there was found to be marked emphysema, with some rhonchus at the bases of both lungs. He was ordered ten drops of pure terebene on a piece of sugar every four hours. On the 1st of December he saw that the cough had been much better, especially in the daytime, and there had been a wonderful improvement in the breath, so that he could get about with comparatively little difficulty. The medicine was not nasty; in fact, it was 'rather palatable.' The dose was increased to fifteen drops every four hours, and on the 8th to twenty-five drops. On the 15th he reported that he was nearly well; the cough had almost gone, and the breathing was better than it had been for years. He was decidedly of opinion that twenty-five drops did more good than ten, and at his request the dose was increased to half a teaspoonful. On the 22d he came in looking bright and well, and declared that he had never had any medicine which had done him so much good. It was 'rather warm going down,' but he liked it and felt better for it. It 'played on the water,' and he passed a great deal. The dose was increased to a teaspoonful every four hours, and this

was taken without difficulty. It excited no nausea, and did not act on the bowels. The administration of the medicine internally was now stopped, but he was given an ounce to use as a spray with Maw's Fountain Odorator. He continued this treatment till the 3d of January, when he was so well that he was discharged."

The tolerance of the drug shown by this patient was very remarkable. In one other case, a man suffering from tapeworm, I gave it in teaspoonful doses four times a day for a fortnight without producing disagreeable symptoms, and without relieving him of his unwelcome visitor. I thought, from its affinity to turpentine, that it might prove beneficial. It is possible that, had I given it in a single ounce dose on an empty stomach, I might have been more successful.

In some cases, as I have said, I give it with olive oil, mixed with oil of peppermint, to disguise the taste, but patients, as a rule, preferred the pure drug. I have already referred to the fact that many of the patients took the pure terebene in the form of an emulsion, containing half a drachm to the ounce. The following are the brief notes of a case treated with this preparation:

CASE III.—"Thomas S., aged 27, is a bath attendant and professional swimmer in the summer, and a scene-shifter and prize-fighter in the winter. He has hardly ever been free from cough since he has been at the baths. He has been under treatment for over six months, and says he has derived very little benefit. On reference to the notes of his case, it is found that he has had mixtures of all kinds, the remedies chiefly prescribed being squills, carbonate of ammonia, chloride of ammonium, and senega. His chest has been painted or rubbed with liniments of all kinds, and he has had carbolic acid and creosote to inhale. He was ordered the emulsion of pure terebene in half-ounce doses every four hours, and in a fortnight he declared that he was better than he had been for many months. His cough had almost gone, and his breathing was decidedly better."

Another way of making an emulsion of pure terebene is to mix it with an equal quantity of cotton-seed oil. You take 160

minims each of pure terebene and cotton-seed oil, mix it with six drachms of powdered acacia and two drachms of powdered sugar, and then add enough water to make four ounces. The dose is from one to two teaspoonfuls, equivalent to from ten to twenty drops. There are no special advantages in this form, and, as a matter of fact, no difficulty is ever experienced in getting a good emulsion of pure terebene.

FIG. 3 —Atomizer for Pure Terebene, Pinol, Oil of Sandalwood, etc.

I have treated several cases of phthisis with pure terebene with benefit. Here is an example:

CASE IV.—"Wm. C. Y., aged 33, a tailor, had had a cough more or less for five years. It was worse in the winter, but rarely left him even in the summer. He expectorated a great deal of thick, yellow phlegm, chiefly in the morning. Four years ago he brought up nearly a pint of blood, and last year

nearly a quart came up. He has lost flesh, but not very much. On examining the chest, there was found to be deficient movement under both clavicles. On the right side there was a little crepitation at the apex, while on the left there was cavernous respiration. He was ordered ten drops of pure terebene on sugar every four hours, with an ounce to be used every week in the form of a spray. At the expiration of a fortnight the cough was easier, and the crepitation at the right apex could no longer be detected. The treatment was continued for two months, and at the expiration of that time he had gained ten pounds in weight and had lost all his symptoms. The physical signs of the cavity were still there, but there were no moist sounds, and the disease was practically arrested."

In a case of dust phthisis occurring in a bricklayer, the same mode of treatment produced equally good results, the symptoms subsiding very quickly.

I have sometimes employed in the form of a very fine spray, in the treatment both of phthisis and chronic bronchitis, a mixture of equal parts of pure terebene, oil of cubebs, and oil of sandalwood, diluted with what is known as "liquid vaseline." This is used by means of an atomizing apparatus, which consists essentially of a large glass jar, in which the medicated fluid is very finely divided and diffused by a blast of air, propelled by a rubber ball or other means. A nose-piece is attached, and the spray may be inhaled through the mouth or nostrils. This formula gives excellent results, not only in winter cough, but in post-nasal catarrh. I made some observations on this point in conjunction with a well-known singer and composer, and was astonished to find what a marvellous difference there was in the tone of his singing voice after using it for only a few minutes. He even thought that it improved the character of his compositions, but on this point I refrain from offering an opinion. The combination is a powerful expectorant, and if inhaled the first thing in the morning, when the mucous membranes are covered with viscid secretion, it will give very great relief.

When experimenting with pure terebene, I made some observations with an allied substance called terpene-hydrate. It is a derivate of turpentine, and is met with in small prismatic

crystals. It is but slightly soluble in water, so I had it made into compressed tabloids, each containing two and a half grains, four being given every four hours. It succeeded admirably in some cases, but, as a rule, it did not answer so well as the pure terebene, and little by little I abandoned its use.

During the last six or eight months I have used pinol in the treatment of winter cough and bronchitis with much success. It is made from the Pumilio pine, growing in Alpine regions, above the snow-level. In therapeutical action it is closely allied to pure terebene, but it is more fragrant. I give it on sugar in ten-drop doses every four hours, and have been much pleased with the results. It is an antiseptic, and is useful in the treatment not only of chronic coughs but of flatulence. As a spray it is wonderfully efficacious, often affording prompt relief. In a few cases I have employed for inhalations a mixture of pinol and pure terebene, usually two parts of the latter to one of the former. Sometimes patients readily take pinol when they dislike the taste of pure terebene. The treatment of bronchitis by inhalation of pinol is carried out systematically in many places on the continent, especially at Baden-Baden, Ischl, and Reichenhall.

At the Westminster Hospital we made a number of observations on the treatment of winter cough with a spray of pure terebene and pinol. As a rule we used a mixture of three parts of pure terebene and one of pinol, the hand-ball spray apparatus being employed. The patients were all out-patients and came to the hospital every morning for treatment. Many of them had been under observation for some time previously. The results were extremely good, most of the patients obtaining immediate relief.

In the following obstinate case (reported by my clinical clerk, Mr. Lucas Hughes) benefit was experienced from the use of a mixture of pure terebene and pinol in the form of a spray:

CASE V.—"J. S., aged 62, is by occupation a tailor, and is much exposed to draughts. He has had a cough seven winters, and a little sometimes in the summer as well. Usually it lasts from November until well on in March. It is distinctly paroxysmal in character, there being on an average twelve attacks in the twenty-four hours, each lasting two or three

minutes. The patient is kept awake coughing night after night and gets very little rest. The expectoration is abundant, thick and yellow during the day and streaked with black toward the evening. There are sometimes streaks of blood after a severe attack of coughing. He is short of breath on exertion, and finds walking very difficult. He has lost flesh considerably and is quite a stone lighter than he was at the

FIG. 4.—Improved Atomizer, made by Codman and Shurtleff, of Boston, Mass.

beginning of the winter. His appetite is bad; and he sometimes vomits after an unusually severe bout of coughing. He has a well-marked arcus senilis and is not ruptured. The chest is markedly emphysematous, and there is a little rhonchus at both bases. The specific gravity of the urine varies from 1.015 to 1.025 and is free from albumin; the heart sounds are normal.

"The treatment was commenced on February 22d, when

he was ordered a drachm of syrup of tar (U. S. P.) with five minims of the 1 in 50 solution of hydrochlorate of apomorphine three times a day. He was given an ounce bottle of pure terebene and told to take ten drops on sugar frequently. The ipecacuanha spray was also used, and he had 30 c.c. of equal parts of the wine and water from a Richardson spray apparatus. On the 23d the spray was repeated, and on the 24th the quantity was increased to 40 c.c. On the 25th he had 40 c.c. of the ipecacuanha wine and water in the morning, and 30 c.c. of the pure wine at his visit in the afternoon. He then reported that his cough was much better, being less violent and less frequent. The expectoration was less in quantity, and was not so thick. The most marked improvement, however, was in the breathing, and he slept better and could get up-stairs with much less difficulty. On the 27th he had another inhalation of 30 cc. of the pure wine, and stated distinctly that the large dose did him more good. He progressed steadily under the same treatment until March 3d, when he caught a fresh cold, and the weather being inclement he thought it best to stay in-doors. On the 7th he came again, and the treatment, for purposes of comparison, was then changed, a spray of three parts of pure terebene and one of pinol being substituted for the ipecacuanha spray. He was also given an ounce of this mixture, and told to take ten drops on sugar frequently. On the 8th the new spray was repeated, and during the inhalation he expectorated a mass of mucus about the size of a shilling, after which the breathing was much easier. On the 9th the spray was repeated; and on the 10th he had the spray of pinol and pure terebene in the morning and of pure terebene alone in the afternoon, the quantity used on each occasion being about half an ounce. His cough was now much better, and the expectoration was less, but the breathing still distressed him at times. On the 12th he was given an inhalation of a drachm of ethereal tincture of lobelia mixed with an equal quantity of water. This was repeated on several occasions, and from this time the improvement was marked. He was given a tonic and discharged."

CHAPTER V.

CHEKEN AND CUBEBS.

My next observations were made with the drug called cheken.

Cheken, or chekan, or chequen—for it is known by all three names—is an evergreen shrub, closely resembling our common myrtle, and it grows abundantly in the central provinces of Chili. It is usually said to belong to the genus Eugenia, but by some it is referred to the closely-allied genus myrtus. The natural order myrtaceæ contains many medicinal plants, as, for example, the clove (Caryophyllus aromaticus), cajeput (Melaleuca minor), pimento (Eugenia pimenta), and the members of the eucalyptus tribe. A good description of cheken, by Mr. Holmes, will be found in the "Pharmaceutical Journal" for February, 1879.

From a manuscript placed at my disposal by Dr. Henry von Dessauer, of Valparaiso, I learned that he had used cheken for some years in the treatment of a number of widely different complaints. Thus, as an inhalation, he uses it in diphtheria, laryngitis, bronchitis, and bronchorrhœa; as an injection, in certain affections of the mucous membranes, as gonorrhœa, leucorrhœa, cystitis, etc.; while given internally, in the form of syrup or liquid extract, it is said to aid digestion, allay cough, facilitate expectoration, and stimulate the kidneys to action. It is also an astringent, and is found to be of special service in threatened hæmoptysis. Dr. von Dessauer used it with marked success in more than a hundred cases of bronchitis and phthisis. For many years he was physician to a large convent-school, many of the inmates of which suffered from consumption; hæmoptysis being of constant occurrence. During the two and a half years that he gave cheken in this establishment, he had not a single death from phthisis, there were no fresh cases of hæmoptysis, and many of the patients who had had repeated attacks of bleeding from the lungs re-

covered and gained flesh and strength in a very marked manner. Equally good results were obtained by other physicians in Valparaiso and elsewhere.

The liquid extract of cheken is made according to the directions given in the United States Pharmacopœia for the preparation of fluid extracts, and corresponds in strength to the fluid extract of cinchona, etc.

In the "Practitioner" of May, 1880, I published a paper on "Cheken in Winter Cough." My first series included notes of fifteen cases of chronic bronchitis in which I employed cheken, all the patients, with one exception, being men. The age of the woman was 51; the ages of the men ranged from 36 to 58. They were all bad cases, most of them of many years' duration. Many of them had been attending at the hospital for some considerable time, and almost without exception they had in former years undergone much medical treatment with comparatively little benefit. Their occupations exposed them to cold, and wet, and draught, and in some instances they had the additional disadvantage of working in a dusty atmosphere. They complained chiefly of paroxysmal cough, with thick yellow expectoration, and much shortness of breath on exertion. On physical examination of the chest emphysema was detected, with or without a little rhonchus at the bases behind. They were, in fact, ordinary cases of winter cough. The liquid extract of cheken was ordered in two-drachm doses in a little water every four hours, the dose being usually increased at the expiration of a week to half an ounce. The medicine was always taken without difficulty. In all cases the patients obtained some benefit, and in most instances the relief was very marked. There was, in a few days, a decided improvement in the cough; expectoration was from the first easier, and soon diminished in quantity, and finally the dyspnœa was less.

The following may be taken as an average case:

CASE I.—"Mark R., aged 40, has suffered from cough, 'off and on,' almost all his life. It is not so bad in the summer, but in winter he 'almost goes in fits with it.' This winter he has 'had it bad' for about three weeks, and is unable to follow his occupation as a packer. There is a great deal of expectoration, which is 'thick and sticky.' Sometimes it is streaked with blood, but only after violent coughing. He is very short

of breath when he moves about, but not when he is quiet and is not coughing. The cough is worse than the shortness of breath, for the attacks of cough come on almost every time he moves, and last from five to ten minutes, straining him very much. He has lost his appetite, but does not think he has lost flesh. On physical examination of the chest there was marked emphysema, and a little rhonchus was found at the bases posteriorly. He was ordered two drachms of the cheken every four hours in half an ounce of water. In a week he returned, and said he was a great deal better in every way. The cough was easier, was 'almost well yesterday.' The phlegm 'comes up more readily,' but he did not think there was less of it. The shortness of breath was less, but that had not improved as much as the cough. On the whole, it had done him 'a great deal of good.' He was told to continue the medicine for another week, and his report then was that there had not been any further improvement, though he had not gone back at all. His cough troubled him at night, and sometimes gave him no rest. The phlegm was somewhat less, and the breathing was a trifle easier. The medicine was then given every four hours, and on this the improvement was very marked. He did not cough 'a quarter so much,' and it no longer disturbed him at night. The phlegm, too, was 'considerably less,' though the shortness of breath was not much easier. He was sure the medicine did him more good when he took it every four hours, and was confident that it had benefited him greatly. He asked for a fortnight's medicine, and did not return."

Even in cases of phthisis some benefit was experienced. For example:

CASE II.—"A clerk, aged 40, with a cavity on the right side and consolidation at the left apex, was ordered two drachms of the liquid extract every four hours. In three or four days he noticed an improvement in the cough; the expectoration was less tenacious, and came up more readily; his breathing was easier; the night-sweating, from which he had suffered slightly for a fortnight, ceased, and he slept better. At the expiration of a fortnight, he said he was better in every way. He continued taking the medicine for three months,

and then, the more distressing symptoms having been relieved, ceased to attend."

In three other cases of phthisis the cheken eased the cough and lessened expectoration; the patients expressing themselves as feeling better. In two cases no benefit was experienced.

That cheken can be given in large doses, without the production of any disagreeable symptoms, is shown by the following case:

CASE III.—"A clerk, aged 36, came to the hospital complaining of a distressing paroxysmal cough, from which he had suffered for about two months. There was very little expectoration, but what little there was was thick and yellow, and came up without difficulty. There was no loss of flesh or night-sweating. The chest was somewhat emphysematous, but no rhonchus could be detected. He was ordered two drachms of the extract of cheken four times a day, and a week later he reported that the cough was much better, and the expectoration nearly gone. He continued taking the medicine for a fortnight longer, and then seems to have caught a fresh cold, for the cough, which had almost ceased, returned with increased violence, accompanied by a great deal of expectoration. He was then ordered an ounce of the extract of cheken in water three times a day, and this he took for a fortnight, not only without difficulty, but with marked benefit to the cough. He was then given, experimentally, an ounce and a half of the liquid extract in a little water three times a day, and this he took for a week without the slightest inconvenience, and without any unpleasant effect, except that it confined his bowels."

Soon after the publication of my paper, war broke out between Chili and Peru, and for a long time the supply of the drug was extremely limited. From time to time, however, I obtained small supplies, just sufficient for my own patients, and the results were extremely satisfactory. In 1882, Dr. William A. Johnson, of Raleigh, Indiana, published a paper in which he stated that he considered that cheken deserved "a high rank among the therapeutic agents indicated in the catarrhal condition of the respiratory mucous membrane;"

while some months later Dr. William Evans, of Belle Plaine, Iowa, recorded a case of winter cough in which "the first few doses acted like a charm, giving immunity from coughing for several hours at a time." In 1884, Dr. Hackleman, of Rushville, prescribed it for a patient who had suffered from a cough off and on almost all his life, especially in the winter months, with the result that the patient was speedily cured. He also used it with benefit in the sympathetic cough which occurs in adults who are brought in contact with children suffering from whooping-cough. In 1885, Tangeman, of Ohio, published an elaborate paper of tne uses of cheken in medicine, in which he gives in detail a number of cases treated by the new remedy, one of the most striking being the following:

"H. O., aged 60, suffered from an old chronic cough, which had lasted for several years. It was scarcely noticeable during the summer; but as soon as the damp weather set in the cough became quite annoying, causing loss of sleep and general debility. There was little or no expectoration. Muriate of ammonia, with ipecacuanha and opium, had been given a faithful trial, but the benefit was only temporary. It was now suggested that cheken should be given a trial. Its use was followed by the prompt relief of the cough, and more easy expectoration and freer breathing. The patient now sleeps well at night."

During the last three or four years I have used the liquid extract of cheken in a large number of cases of bronchial catarrh, but I have not thought it worth while keeping notes of the results. It seems to me that it comes in admirably toward the end of a course of treatment, just to give the finishing touches to the cure. I rarely use it in the initial stages, but it comes in handy later on.

Concurrently with these observations I treated a number of cases with cubebs, a remedy which was brought to my notice by Dr. George Bird. The tincture was given in hot linseed tea, flavored with lemon-peel, night and morning, the patient being instructed to sip it slowly. In a few cases the powdered cubebs was given, but it usually made the patients sick, and many of them complained of its nauseous taste. The results obtained with the tincture of cubebs were excellent, and I

should certainly recommend it in old-standing cases, especially when the expectoration is thick and yellow.

The following is a rough jotting of a case of winter cough greatly benefited by the administration of cubebs:

CASE IV.—"George R., aged 32, is a painter and grainer. Is much exposed to wet, and often has to stand for hours in houses before they are dry. Has had a winter cough three or four years: comes on just at the beginning of November, and lasts till the summer. Coughs the best part of the day: begins as soon as he gets up, and does not stop till he gets to bed again. Brings up a good deal of phlegm—a cupful or more at a time, often streaked with blood. Shortness of breath is often very great at times, especially after an attack of coughing. Has lost a little flesh, but nothing much. Physical signs: 'Expiration much prolonged both sides, and sonorous rhonchus, both with inspiration and expiration, all over front and back.' Ordered tincture of cubebs, two ounces. A teaspoonful, in a cup of hot linseed tea, to be sipped slowly night and morning. A week later much better, cough easier, rhonchus less, expectoration brought up more freely, and breathing less difficult. Continued for another week, when reports that he is nearly well. A third week completes the cure."

The next case is one of winter cough complicated with albuminuria, and treated with tincture of cubebs:

CASE V.—"William B., aged 58, a laborer, works on the barges for a contractor, unloading ashes, breeze, stones, and gravel. Has been at it for fifty years, and has been out in all weathers since he was a boy eight years old. Has never known what it was to have a home, and has slept mostly where he could. Drinks a tidy amount, but not more than most of his mates. Has patronized most of the hospitals at one time or another, and thinks they are useful institutions. Has had a cough for a good many years, but as a rule has not taken much notice of it. Cannot say how many years he has had a cough, for he has no wife and no family, and nothing in particular to go by. Thinks it came on when first he worked on the canal, but cannot say when that was. Spits a good lot, but, being on the barge, does not pay much attention to

it. Does not think he ever spat blood; might have done, but, if so, never heeded it. Is short of breath, worse luck, and would like to be as 'fly in the wind' as he was when a youngster. Would be grateful for anything that would do him good. Examined, is found to have sibilant rhonchus all over chest in front, with moist sounds posteriorly. Urine contains nearly two-thirds of albumin, not examined for casts. Given a teaspoonful of tincture of cubebs four times a day. No means of getting linseed tea, so told to take it neat or in beer. A week later reports no difficulty in taking it, eased cough wonderfully, took the tightness out of his chest, and made breathing easier. Acted on water wonderfully. Urine now contains only one-sixth albumin. Medicine continued, and a week later patient reports that he is better than he has been in winter for a long time, cough almost gone, expectoration less, and breathing nearly well. Urine, albumin only a trace. After another week's treatment, there is only a trace detected with difficulty. Cough almost gone. Given a tonic, and discharged greatly benefited."

A case of old phthisis and winter cough treated first with powdered cubebs and then with the tincture:

CASE VI.—"Mary M'C., aged 46, had a cough from the time she was 17 to about 24. It then left her for about five years, but after the birth of her first child it returned, and she has had it more or less, winter and summer, for the last eighteen years. Sometimes it goes away in the summer, but not infrequently it lasts all the year round. This year she has had it since July right up to the present month of December. It comes on in fits, and is especially bad if she is washing, the steam soon setting her off. There is a great deal of expectoration, thick and yellow, but fairly easy to get up. She has spat blood, but not much of late years. She is short of breath, especially when she goes out in the fog or into a cold room. Sometimes she gets shortness of breath in the evening without very much cough. This shortness of breath is just as bad in the summer as in the winter. On examining the chest, it is found that there is a great deal of high-pitched rhonchus. The breathing can be heard without the aid of the stethoscope, and at some distance from the chest. The patient

was ordered a drachm of powder cubebs in water three times a day. She reported that she had much difficulty in getting it down, and that it made her very sick. Still she persevered with it, and it certainly brought up the phlegm, and eased the breathing wonderfully. At the end of a week she was given the tincture of cubebs—a teaspoonful—in a cup of hot linseed tea three times a day. This answered almost as well, and was much less disagreeable to take. At the expiration of a fortnight of this treatment, the cough had almost gone, and, to use her own expression, she was 'quite a different woman.' She was given a teaspoonful of the syrup of the hypophosphites twice a day, and a month later returned to say that she was stronger and that there had been no return of the symptoms."

When the asthmatic symptoms predominate, I often use cubebs in the form of cigarettes, telling the patent to inhale the smoke well into the lungs. Sometimes I have the cigarettes made in a small machine, or rolled by hand; and sometimes I prescribe Marshall's cubeb cigarettes, which are largely sold in America under the name of "Smoke Cubebs." The odor of burning cubebs is, perhaps, not very agreeable, but that is a matter of small consequence to an asthmatic, or sufferer from emphysema. For hospital patients, I usually prescribe a couple of ounces of dry finely-powdered cubebs. and instruct them to smoke it in a pipe.

CHAPTER VI.

CHLORIDE OF AMMONIUM INHALATIONS.

THE value of chloride of ammonium in the treatment of many affections of the respiratory organs is very generally recognized. From time immemorial it has been given in the form of a mixture often in combination with carbonate of ammonium, senega, and other drugs. Its pungent saline taste can be disguised by the addition of a little liquid extract of liquorice—say half a drachm to the ounce. Compressed tabloids of chloride of ammonium are useful in many catarrhal conditions of the fauces and pharynx, and are largely employed by singers and public speakers. When the action of the drug on the larynx, trachea, or bronchial tubes is required a different mode of administration must be resorted to, and the drug is then inhaled in the form of fumes or smoke, developed by the combination of the vapor of hydrochloric acid and ammonia. Many forms of apparatus have been devised for generating nascent chloride of ammonium, and I agree with Dr. Kendal Franks, of Dublin, who recently published in the "Lancet" an interesting article on the subject, that by far the best is the Vereker chloride of ammonium inhaler. I have had one in constant use for the last three years, and find that it answers admirably. It consists essentially of three bottles with connecting tubes. In the first is placed hydrochloric acid, in the second a mixture of ammonia and water, while the third, which communicates with the other two by a three-way tube, acts as a wash-bottle and separates any trace of free acid or ammonia from the vapor. The whole apparatus is perfectly simple, and a quarter of an hour devoted to getting it into working order and regulating it will amply suffice for a supply of inhalations for many weeks. The only difficulty I have experienced has been in getting the vertical tubes which regulate the amount of air passing through the acid and ammonia to slide up and down in the

india-rubber corks, but this is easily overcome. All you have to do is to push out the tubes, clean them carefully, and apply a drop of oil, when they work with the greatest ease. I generally detach the india-rubber tubing leading to the mouthpiece, and substitute for it a piece three or four yards long The advantage of this is that the patient is not obliged to bend over the apparatus, but can sit back in his chair, or stand up and take a good deep inspiration, completely filling the chest. Some patients do not know how to breathe, but take little puffs which are no good; but a few minutes' instruction and a practical illustration or two usually sets this right. One man I remember, and only one, who could not be

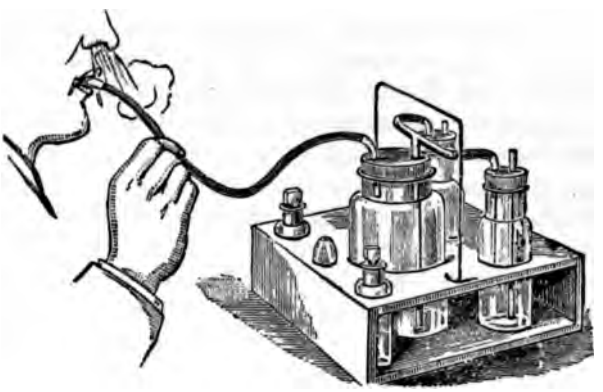

FIG. 5.—Vereker Chloride of Ammonium Inhaler.

made to breathe properly. After several futile attempts to teach him, I got out of patience and packed him off to a singing-master to have lessons in the art of breathing. It was a lucky thing for him that I did so, for his professor discovered that he had a tenor voice of exceptional tone and quality. He took lessons, and after a couple of years' instruction and hard work developed into a "professional," and is making a large income. He now "blows a cloud" with the apparatus with the greatest ease. Patients sometimes complain that the fumes are acid, and that they cause choking. As a matter of fact, a little excess of acid rarely does any harm, while an excess of ammonia is very irritating. The method for avoiding an excess of ammonia is simple. Put into the wash-bottle a little tincture of litmus and a few drops of acetic acid. As

long as the water is colored red there is no fear of any uncombined ammonia coming over, as it is seized by the acetic acid. When the water turns blue a little more acetic acid must be added. In cases of catarrhal deafness, the fumes are readily forced up the Eustachian tube by filling the chest and mouth, pinching the nose, and then swallowing. It is astonishing what good this method of treatment often does. Sometimes I use the chloride of ammonium fumes alone, but far more commonly I employ them as a vehicle for the administration of other remedies. For example, I want to give pure terebene in a case of winter cough. All I do is to put a few drops on a piece of absorbent cotton wool and introduce the little pellet into the water of the wash-bottle. The fumes which come over are impregnated with the pure terebene, and are carried to the innermost recesses of the bronchial tubes. In the same way I give inhalations of oil of cubebs, oil of sandalwood, and various other volatile drugs which exert a beneficial action on respiratory apparatus. I have cured, in this way, obstinate cases of bronchial catarrh, chronic bronchitis, post-nasal catarrh, and deafness resulting from obstruction of the Eustachian tube.

The "vaporoles," prepared by Messrs. Burroughs, Wellcome & Co., may be used in connection with the Vereker inhaler. They consist of little glass capsules containing the drug, surrounded by absorbent cotton wool, and encased in silk. The capsule is crushed and dropped in the water in the wash-bottle. The vaporoles are numbered according to the following list:

1.	Vaporole of	carbolic acid,	20	minims.
2.	"	nitrite of amyl,	5	"
3.	"	ether,	30	"
4.	"	compound tincture of balsam,	30	"
5.	"	chloroform,	30	"
6.	"	creosote,	10	"
7.	"	oil of lemon and cubebs,	5	"
8.	"	tincture of iodine,	10	"
9.	"	oil of juniper,	2½	"
10.	"	pure terebene,	10	"
11.	"	pinol,	10	"
12.	"	oil of eucalyptus,	10	"

Dr. Kendal Franks, to whose paper I have already referred, says: "I have found the best results to follow the inhalation of chloride of ammonium in chronic catarrhal conditions. In acute catarrh it does little good—at least, when the disease is once fully established; but in the beginning of an acute catarrh I believe it will be found often to check its further progress. I have known it to be so in my own case, and have been greatly gratified to find the symptoms of a cold in the head disappear after an hour's intermittent use of the inhaler. In chronic catarrh of the post-nasal region, so frequently associated with deafness, due either to chronic otitis media or to obstruction of the Eustachian tubes—conditions sometimes very intractable to ordinary means—I have found the regular use of the inhaler for weeks, or even months, give the most satisfactory results. The best method of using it in nasal catarrh, or in chronic inflammation of the mucous membrane lining the nasal or post-nasal regions, is to inhale freely by the mouth and exhale by the nose. In this way the chloride of ammonium comes directly in contact with the affected parts. In catarrhal conditions of the middle ear or of the Eustachian tube, the salt can be brought directly to bear upon these parts by having recourse to Valsalva's method of inflating the ear. A deep inhalation is made by the mouth; then exhalation through the nose is begun, and as soon as the white cloud is observed to emerge from the nostrils, they are closed by suddenly compressing them between the thumb and forefinger. The mouth is firmly closed, and the patient makes an effort, as it were, to force the air through the nostrils. The apertures being closed, the distending power of the exhaled air forces open the Eustachian tubes, and the vapor enters through them into the tympana. This may be done two or three times at a sitting without any evil effect. I have met with many cases where this plan of treatment has alone sufficed to effect a cure where other methods had failed. When the Eustachian tubes are obstructed, so that air cannot be forced through them by Valsalva's method, the occasional use of Politzer's bag during the earlier part of the treatment will usually suffice. In chronic laryngitis, especially of the catarrhal form, chloride of ammonium inhaled is of great value. In the early stages of that form of laryngitis which so often accompanies phthisis, when there is erosion of the

mucous membrane covering the inter-arytenoid fold, or when there is chronic inflammation of the vocal cords themselves, I have seen good results follow from this vapor; more especially when combined with some volatile oil, such as oil of eucalyptus or pine oil, in a manner I shall immediately describe. Again, much benefit may be derived from its use in affections of the trachea and bronchial tubes. Some years ago I prescribed it for an elderly gentleman who was confined to his room in the beginning of winter for a chronic cough. He had been liable to chronic bronchitis every winter, which kept him in-doors for several months. Most of the usual remedies had failed with him, so, at last, I determined to try the effect of chloride of ammonium as an inhalation. He was directed to use it three times a day, for fifteen minutes at a time. In a fortnight he was sufficiently well to go out, and the use of the inhalation during the winter prevented the return of his bronchial trouble."

For the last three years I have employed this chloride of ammonium inhaler in a large number of cases, and the results, I am glad to say, have been almost uniformly successful. I have used it both at the hospital and in private practice with equal benefit. At the hospital the patients come every day for ten days or a fortnight, and the inhalation is superintended by one of the clinical assistants. It is not a good plan to give the patient the apparatus straight off. He must be carefully instructed in its use, or too often he makes some mistake and does himself more harm than good.

The following are rough jottings from some of the cases in my note-book:

CASE I.—"G. H., member of Parliament, has had a bad cold for three days, constant sneezing, and running from eyes. Dull, heavy, and depressed, can't read and can't think. Little cough, but not much. Pain across forehead, and disinclination for exertion. Has had a Turkish bath, and took two pills last night. Has been using some strong smelling salts his chemist gave him. Is anxious to get well, as he has to speak in the House one day this week. Given the chloride of ammonium inhaler with a mixture of pure terebene, oil of cubebs, and oil of sandalwood in the wash-bottle. Much pleased with it, and insists on using it for nearly half an hour. Says the

smell of the sandalwood is strangely familiar to him—can't account for it. Comes next day and again inhales for half an hour. Writes at the end of week to say he is all right, and that he made a brilliant speech."

CASE II.—"M. B., a general, retired. Is deaf; has been deaf for years. Was in the artillery; says all gunners are deaf, so that they never hear anything not good of themselves. Has strange noises in his ears. Dislikes any noise in a room, especially rattle of knives and forks at dinner. Prefers dining alone on this account. General condition very bad, partly from want of exercise. Has consulted all the specialists, and has had his ears examined with many strange instruments. Says that the advantage of consulting many doctors is that no two of them agree, and you are not alarmed by what they tell you. Not much in favor of inhalers. Tried one once, but it blew up. Is introduced to the Vereker inhaler and takes to it kindly. Chloride of ammonium used first alone and then with pinol. Purchases one for himself, and at end of month writes to say it has done him much good."

CASE III.—"Mr. M'C., a well-known architectural sculptor, has had cough in winter for many years. Travels about a good deal, and is often in damp, dusty places. Is very short of breath, especially on exertion. Is ordered syrup of tar and takes several pints of it. Also has the chloride of ammonium inhaler, which he used pretty constantly for two years, sometimes alone and sometimes with pinol, pure terebene, cubebs, or sandalwood. Takes pure terebene or pinol when he is travelling. Derives much benefit from the treatment, but never really gets rid of the cough."

CASE IV.—"Mr. C. C., formerly a Common Councilman, but has retired from business, has mitral regurgitation, irregular action of heart. Much benefited by small doses of digitalis or strophanthus. Very subject to bronchitis, and has to take the greatest care of himself. Has tried many remedies, but likes none so well as the chloride of ammonium inhaler. Three or four visits generally set him right again. Always flies to it on the outset of an attack. Says it is his sheet-anchor. Has consulted me at intervals for eight years."

CASE V.—"Captain W., commander of an Australian liner, has been at sea all his life and is very subject to a cough. Has had plenty of medical advice from his surgeons. Has a collec-

tion of prescriptions of his own. Tries them on other people first, and if they do well takes them himself. Is always taking medicine. Chloride of ammonium inhaler eases cough and brings up phlegm. Will take one on his next voyage with a supply of pinol, pure terebene, and cubebs. Will try it on the passengers. He is not heard of again."

CASE VI.—"Miss A. W., singer, contralto, often loses her voice, especially when she has an engagement. Chest and vocal cords healthy. Thinks symptoms partly due to nervousness. Voice uncertain, and apt to give in the wrong place. Something wrong with an upper C. Uses the chloride of ammonium inhaler, and takes phytolacca assiduously for a couple of days before singing. Maintains that it does her good. Impossible to contradict a lady, so treatment continued."

A word about the duration of the inhalation. At first I was accustomed to order it to be used for about ten minutes three times a day, but further experience demonstrated that much better results could be obtained by inhaling for half an hour or more three times a day. This is a point to which sufficient attention is not paid. To get the best possible results from the Vereker chloride of ammonium inhaler a certain amount of experience in its use is necessary.

The following case, recently treated at the Westminster Hospital, shows the benefit to be derived from the chloride of ammonium inhaler, combined with cubebs when the inhalations are given daily for half an hour or more:

CASE VII.—"Thomas S., aged 42, cook in the House of Commons, has had a winter cough for the last five or six years, attributable, he says, partly to the heat of the kitchen, and partly to having to cater for members of such various shades of political opinion. The strain on his mind is very great, and he fears that unless he improves he will have to give up the profession. He drinks beer, the wines at the House not being quite up to his mark. His cough troubles him and keeps him awake at night, and there is a good deal of expectoration. His chest is emphysematous, and there is a good deal of rhonchus at both bases. On March 28th he was given an inhalation for half an hour with the Vereker chloride of ammonium inhaler, and this was repeated on the 29th, 30th,

and 31st, with benefit both to the cough and shortness of breath. On the 3d of April the inhalation was repeated, with the addition of a few drops of oil of cubebs, on absorbent cotton wool in the wash-bottle. This was continued daily for half an hour until the 11th, when all the prominent symptoms had subsided, and he was discharged practically well."

CASE VIII.—"Jane S., aged 37, has had a cough chiefly in the winter for eight years. It is always worse when she is pregnant, a condition which occurs frequently. The cough is hard, she says, and it reminds her of a dog barking more than anything else. The attacks come on in paroxysms and last ten minutes or more, accompanied by copious expectoration. She is a charwoman by birth, but does a little laundry work as well, and that knocks her up more quickly than anything. The cough makes her short of breath, and she has great difficulty in getting up-stairs. She was treated with the chloride of ammonium inhaler, a few drops of cubebs being placed on the cotton wool in the wash-bottle. The inhalation was given for half an hour daily, and in six days, aided by a little improvement in the weather, she was so much better than at her request she was discharged. She was given enough aromatic syrup of tar to last a fortnight, and was not seen again."

Case of chronic bronchitis in a beer-drinker treated with chloride of ammonium inhalations:

CASE IX.—"Eliza W., aged 32, a bookbinder, has had winter cough for twelve years. The cough is hard and dry at first, and then after a time gets looser, and there is a good deal of expectoration. It is a violent cough, and is usually worse the first thing in the morning. The patient is a large beer-drinker; she does not care for spirits, but at night when the work is over she and some other girls get together and drink as long as the money lasts. On examination she is found to be emphysematous, and there is a good deal of rhonchus over both sides of the chest. She is very nervous and shaky, and has to be given some quinine and iron before the treatment for the bronchitis can be proceeded with. On the 9th, 10th, 11th, 12th, 13th, and 14th she has an inhalation for half an hour each time. The cough improves, the expectoration diminishes, and she is discharged with a recommendation

to abandon the beer-drinking orgies in favor of a lighter and more frivolous form of amusement."

Case of bronchitis in a child (reported by Mr. E. Lucas Hughes) treated by inhalations of chloride of ammonium and cubebs:

CASE X.—"Alice W., aged 10, is stated on the authority of her mother to have had a very bad attack of bronchitis when fifteen months old. She has suffered more or less ever since from bronchitis, usually in a chronic form, with from time to time acute exacerbations. It is bad all the year round, but worse in the winter. It commences quite at the beginning of the winter, lasts through the winter and early spring, without much improvement till May. The child is fairly well for only three or four months in the year. The attacks of cough are always violent and prolonged. The mother says it is a hard cough which shakes the room. Sometimes it ends in vomiting. There is a great deal of phlegm, but usually it comes up quite easily. It is sometimes yellow and sometimes white, and sometimes it is streaked with blood. The child is short of breath and cannot join in games as other children do. She does not lose flesh, and her appetite is fairly good, but she is weak and delicate and sweats a great deal at night. The parents were always ill more or less: the father died of bronchitis, and the mother looks as if she would follow in his footsteps. On examining the child she is seen to be thin and ill-nourished. The chest is emphysematous, and there is sibilant rhonchus all over back and front, with bubbling rhonchus at the bases posteriorly. She had had cod-liver oil and a good deal of tonic medicine, but without materially benefiting the cough.

"On April 9th she had an inhalation of chloride of ammonium from the Vereker apparatus, a few drops of oil of cubebs being placed on the cotton wool in the wash-bottle. She soon learned to inhale well, taking the fumes right down into the chest. It was repeated the next day, and on the 11th the time was increased to half an hour. During the inhalation she expectorated usually from two to four ounces of thick yellow phlegm. On the 13th and 14th the half-hour inhalation was continued, and then in consequence of bad weather the treat-

ment was temporarily suspended, the child being unable to come in the rain. On the 19th the treatment was resumed and the inhalation was given for an hour, the result being the expectoration of five ounces of mucus. On the 20th the inhalation was given for three-quarters of an hour, and on the 21st and 23d for an hour each time. The last inhalations were on the 25th and 26th, when the child had improved so much that her further attendance was not necessary. She had been under treatment seventeen days, and had had eleven inhalations. The final note was: 'The patient has very greatly improved. For the last five days there has been no expectoration during the inhaling, and although the weather has been very unfavorable the cough has practically left her.'"

The following is a successful case in an adult:

CASE XI.—"Mary H., aged 21, is engaged in mantle-making, and works ten hours a day and sometimes more. She has half an hour's walk to and from business, and as her boots are bad and her cloak worn and thin, she often gets wet and catches cold. Her earnings are small and she does not get too much to eat. She has had a cough ever since she was fourteen, bad all the year round and worse in the winter. She has spat blood several times, a pint or more at a time, but never enough to prevent her going to business if they were busy. She has never been weighed, not being able to afford expensive luxuries. She is short of breath, but as she has no stairs to go up does not complain. She is extremely anæmic and looks weak and ill. She has some consolidation at the right apex, but there is no crepitation, probably in consequence of her straitened circumstances. She was taken in charge by Mr. Hughes, who superintended the administration of the choride of ammonium inhalation with cubebs for ten days. It eased the cough and shortness of breath, and she was grateful. She was given some iron and cod-liver oil, which did her good. What she wanted most was a good meal, but that was not in the hospital pharmacopœia."

In many cases of congestion of the nasal mucous membrane and post-nasal catarrh the inhalation of chloride of ammonium is useful.

Case of congestion of the nasal mucous membrane treated with inhalations of chloride of ammonium (reported by Mr. E. Lucas Hughes):

CASE XII.—"Edith H., aged 13. It is stated by the parents that for the last three years she has not spoken clearly, and it seemed as if her nose were stopped up. She has never had any illness except measles when eighteen months old, and since then she has never closed her mouth properly. A year ago she became very deaf. She had a profuse discharge from the right ear, especially at night. It lasted over a month and then ceased; since that her hearing has improved. Her tonsils were supposed to be enlarged, and she was treated with a gargle of chlorate of potassium (a saturated solution in water) for some weeks with benefit. She was sent to a special hospital for diseases of the throat, and underwent several operations, a portion of the mucous membrane being removed, it is said, but there was no improvement. She snores at night and aways sleeps with her mouth wide open. On examining the nose the mucous membrane was found to be greatly congested, and the apertures were almost completely closed posteriorly. She was given the chloride of ammonium inhaler for forty minutes daily. After six inhalations the nasal mucous membrane was found to be nearly normal in appearance, and she could breathe with much less difficulty. After the tenth inhalation she was still better and slept with her mouth shut. The inhalation was now given twice a day, half an hour in the morning and an hour in the afternoon. At the expiration of fifteen days the child was much improved. Two months later she returned, and on examination it was found that the mucous membrane of the nose was again very much swollen. There was a return of the old symptoms: she slept with her mouth open, made a peculiar snoring noise in her sleep, and was deaf in both ears. The inhalations were resumed for an hour daily, pure terebene and pinol being added to the water in the wash-bottle. The improvement was marked, but the inhalations had to be continued for a month before it was felt safe to discharge her."

Case of obstruction of the nostrils due to swollen mucous membrane in a child:

CASE XIII.—"George C., aged 14, has been deaf and has had much difficulty in breathing through his nose for the last seven years. He had measles when about five, followed by scarlet fever, after which he had his tonsils removed. He was a seven months' child and has always been delicate. He has been at a boarding-school and has made much progress, but his lessons have always been a difficulty to him. In the winter he has a cough, and unless fed up and taken great care of gets so weak that he can hardly get about. The mucous membrane of both nostrils is swollen and inflamed, and the right membrana tympani is ruptured. On April 12th treatment was commenced with the chloride of ammonium inhaler, the patient on four consecutive days inhaling for half an hour a day. The cough was relieved and there was less difficulty in breathing through the nostrils, the mucous membrane of which was less congested. From the 17th to the 21st the inhalation was given for an hour daily, and the improvement was much more marked. The cough ceased, the breathing was easier, and the patient slept well at night. The inhalations were then discontineud, and the patient was given iron and cod-liver oil. The improvement resulting from the inhalations was very noticeable."

The following case, treated by Mr. Lucas Hughes, illustrates the benefit which may be derived from prolonged inhalations of chloride of ammonium in children:

CASE XIV.—"Minnie C., aged 8, has always been a delicate child. Had scarlet fever, followed by croup, bronchitis, and inflammation of the lungs. Has had a cough almost ever since, worse in winter, but practically continuous all the year round. She sleeps with her mouth open and is deaf in both ears. She is very short of breath and is incapable of much exertion. She sometimes has acute febrile attacks lasting for several weeks, during which her eyelids swell and she sneezes a great deal. On examining the chest it was found that there was sibilant rhonchus all over both sides. She was given the Vereker chloride of ammonium inhaler, and told to inhale for half an hour. The treatment was commenced on April 21st, and on the 24th it was increased to an hour a day. On the 26th there is a note that the cough has greatly improved and

that she sleeps better at night. The treatment was continued until May 10th, when the cough had ceased, and on examination of the chest it was found that the morbid sounds in the chest had disappeared. Her mother stated that she was better than she had been for some years. No difficulty was experienced in teaching the child to inhale, and she seemed thoroughly to enjoy the operation."

The following case was also treated at the hospital:

CASE XV.—"Kate S., aged 27, married, has had a cough more or less ever since she was three years of age, but it has been much worse the last nine years, especially in winter. She has five or six paroxysms every day, each lasting for three or four minutes. The expectoration is very copious, is thick and yellow, and comes up easily. She has noticed streaks of blood from time to time. She is short of breath and has some difficulty in getting about. She has no appetite and has been losing flesh for over a year. The chest was carefully examined, but nothing was detected beyond slight emphysema. Mr. Hughes gave her an inhalation from the Vereker inhaler daily for an hour for eight days, and at the expiration of that time she had much improved, and the cough troubled her but little. She was given Kepler extract of malt and cod-liver oil for a fortnight, and was then discharged much better in every respect."

CHAPTER VII.

FUMING INHALATIONS.

FUMING inhalations—inhalations, that is to say, of smoke of various kinds—are of service in the treatment of chronic bronchitis, especially when the asthmatic element predominates. The ordinary nitre papers are made by dissolving from half a drachm to a drachm of nitre in water and saturating blotting-paper with the solution. When dried they burn readily, giving off dense white fumes. The smoke has been analyzed and is found to contain carbonic acid, nitrogen, watery vapor, cyanogen, ammonia, and nitrate of potassium. Hyde Salter, in his classical work on asthma, narrates many cases of spasmodic dyspnœa which have been benefited by this simple remedy. The ordinary nitre papers often fail to give relief because they are not strong enough. For some years past I have used very strong nitre papers containing both the nitrate and the chlorate of potassium. Each paper is composed of six folds of blotting-paper, six inches square, and they are made by dipping them in a hot saturated solution of chlorate of potash and nitre. They should be dried slowly in front of the fire, or better still, in the open air. The papers so prepared, which may conveniently be called nitre tablets, are as thick as cardboard, and they are covered all over with crystals of the salts with which they are saturated. Sometimes I add iodide of potassium to the solution, and this, I think, increases their efficacy. Before they are quite dry they may be sprinkled with Friar's balsam, essence of camphor, tincture of sumbul, or tincture of stramonium. In this way several varieties of nitre paper are available. Sometimes one form will succeed when others have failed. Their mode of use is simple. The door and windows having been closed, the tablet is folded in the middle so as to make it like a tent or the half-open cover of a book. It is placed on a tin plate or the fire-shovel and lighted at each end, when it burns very

rapidly, throwing out flames often four or five inches long, and giving rise to dense volumes of smoke. They should not be lighted near the bed in case of accident. They are strong—strong enough to burn the house down unless care be taken. The sufferer often obtains speedy relief and drops off to sleep. They apparently exert some narcotic action, for they will often answer in cases of sleeplessness after the failure of opium, chloral, and other narcotics. Many of my patients, suffering from chronic bronchitis, speak highly of them; but they do not succeed in every case, and they must be used with caution. The "ozone papers," so largely advertised, probably contain iodide of potassium in addition to the nitrate, and this is undoubtedly a useful adjunct. Care should be taken in the selection of the blotting-paper employed, for much of it is made of coarse rags which, when burned, give off a most irritating vapor. I usually choose a white paper, and often place a small piece under the microscope to see if it is suitable for the purpose.

Some years ago, Mr. Martindale made me some "asthmatic pastilles," which contain, I think, equal parts of nitre, chlorate of potash, and lycopodium. They are cast in moulds, and when dried burn readily, giving off white fumes.

There are several powders which, when burnt and the smoke inhaled, are used for the relief of asthma. Probably the best known of these is Himrod's powder, but Bliss's cure, the Green Mountain (Vermont) cure, and Hockin's remedy run it hard. From Himrod's powder may be obtained an alkaloid which, when applied to the eye, dilates the pupil. I will not hazard a guess at the composition of these remedies, especially as some of them in all probability vary from time to time, but the following formula from the "Extra Pharmacopœia" may throw some light on the subject:

PULVIS LOBELIÆ COMPOSITUS.

Nitrate of potassium, . . .	2 ounces.
Boiling distilled water, . . .	2 "

Dissolve and add to—

Lobelia in powder, ...	Of each 2 ounces.
Stramonium leaves in powder, . .	
Black tea in powder, ...	

Mix well and dry.

I am not sure that fennel would not in some cases be a useful addition.

The following formulæ for fuming inhalations will be found useful:

(1) Powdered nitre, an ounce; powdered anise fruit, one ounce; and powdered stramonium leaves, two ounces.

(2) Powdered nitre, one ounce and a half; powdered anise fruit, one ounce; powdered stramonium leaves, two ounces; powdered sumbul root, one ounce.

(3) Powdered nitre, one and a half ounces; powdered anise fruit, one ounce; powdered stramonium leaves, two ounces; powdered benzoin, one ounce.

The various forms of incense are wonderfully useful in the treatment of chronic bronchitis. Sometimes I buy it at the shops and sometimes have it made according to one or other of the following receipts:

No. I.

Styrax,	5 drachms.
Benzoin,	3 ounces.
Sumbul,	1 drachm.
Frankincense,	5 drachms.

No. II.

Powdered cascarilla,	1 ounce.
" myrrh,	Of each ½ ounce.
" styrax,	
" benzoin,	
" frankincense,	
Burgundy pitch,	

No. III.

Olibanum,	2 ounces.
Benzoin,	1 ounce.

Mr. Martidnale, of New Cavendish Street, London, makes "asthmatic pastils" of chlorate of potash, nitre, and lycopodium. If burnt in the bedroom at night, they will be found wonderfully efficacious in allaying cough and easing shortness of breath.

Marshall's cubeb cigarettes and the "cigares anti-asthmatiques de M. Joy" are often used with advantage.

Arsenic taken internally is useful both in asthma and chronic bronchitis, and arsenical cigarettes, made of paper impregnated with arsenate of soda, so that each contains about three-quarters of a grain of the salt, may often be prescribed with advantage. The patients should inhale the fumes strongly three or four times, taking them well into the chest. I have never known them produce any disagreeable symptoms.

Stramonium cigarettes, made from the leaves of the common thorn-apple (Datura stramonium), are frequently smoked with advantage. A special preparation, known as Datura tatula, is still more efficacious. Whether it is a distinct species, or simply the Datura stramonium cultivated with care and grown under favorable circumstances, I have not been able to ascertain. At all events it answers well in relieving dyspnœa, and patients frequently tell me that they smoke a pipe of it before going to bed and the first thing in the morning with advantage. Patients who live in the country should cultivate their own stramonium, which will grow on any dung-heap. For those who are not habitual smokers tobacco is a useful remedy. Most people, however—ladies included—are nowadays so accustomed to the use of the weed that tolerance has long since been established, and it is comparatively little used as an antispasmodic. For women who have never smoked, a good Turkish cigarette immediately after breakfast, or on retiring to rest, is often useful, facilitating expectoration and lessening dyspnœa.

As these fuming inhalations are used chiefly in cases of spasmodic dyspnœa, I may mention that I have found Grindelia robusta useful in asthma, given internally in the form of the liquid extract. I remember one case especially, in which, for a time, it answered admirably. The patient, a young woman of nineteen, had suffered from spasmodic asthma for two years, and had been under treatment for eighteen months. Her attacks usually came on once or twice a week, but sometimes oftener. They lasted usually only five or six hours, but occasionally a couple of days. In the intervals she was perfectly well and had no cough. On physical examination of the chest a little emphysema was detected, but nothing more. She was not febrile, her temperature taken at bedtime for three weeks ranging from 97.6° to 99.4° F. She had had a

great deal of treatment, the list of remedies including arsenic, belladonna, ipecacuanha, lobelia, iodide of potassium, citrate of caffeine, stramonium and datura tatula, jaborandi and pilocarpine, Jamaica dogwood, quebracho and its alkaloid, nitrite of amyl, nitro-glycerin, iodide of ethyl, pure terebene, resorcin, hypodermic injections of morphine and atropine, nitre papers and tablets, cubebs cigarettes, Himrod's and the Green Mountain powders, and sprays and inhalations of all kinds. The first specimen of Grindelia robusta was a sample sent me from America, and it answered admirably, relieving the spasm almost immediately. A supply was then obtained from a wholesale chemist in the city, but it had comparatively little effect. A specimen from a retail chemist was better. Finally a supply was sent over from America. The four specimens tried for this patient might be arranged in the following order, according to their activity:

(1) American sample.
(2) American supply.
(3) Retail specimen.
(4) Wholesale specimen.

In prescribing Grindelia robusta great care must be taken to see that the drug is of good quality. Many of the failures are, I am sure, attributable to the employment of unreliable preparations.

The following is a case of winter cough, accompanied by great shortness of breath, in which Grindelia robusta did much good:

CASE I.—"Charles B., a carman, aged 32, has had a cough every winter for four or five years. He is free from it, as a rule, in the summer, but it is apt to return if he is exposed to cold or gets wet. He is greatly troubled with shortness of breath. The attacks come on usually about three in the morning, and often last four or five hours. He has had as many as three in the week. He often has these attacks in the summer, but they are worse in the winter. The last week they have been so bad that he has been unable to go to work. They come on now quite independently of the cough. On examining the chest he is found to have cooing rhonchus all over both sides. Ordered an ounce of liquid extract of Grindelia robusta, twenty drops in water every four hours. The same

day he was better, and on the following day he was able to go to work. It did much good to the breathing, but hardly affected the cough. He continued taking the medicine for a month and derived much benefit from it."

In the following case, in which there was a double basic murmur, benefit was experienced:

CASE II.—"Jacob B., aged 56, has had a cough for a year, chiefly in the daytime, and chiefly on exertion. It is bad, but it is not nearly so bad as the shortness of breath. The attack comes on every morning about three and lasts an hour. He wheezes so much that he disturbs the house. He does not know what brings it on, but it is quite uninfluenced by food. He has had gout, and on examining the chest it is found that he has a double basic murmur. Ordered twenty drops of the liquid extract of Grindelia robusta, to be taken in water frequently. A week later he returned and said that the medicine had done good to the attacks; they lasted only ten minutes or a quarter of an hour, instead of an hour. The cough was about the same, and certainly was no better. The last three days he had taken twenty-five drops five or six times a day. During the following week the dose was increased to thirty drops, and this did even more good. The grindelia was now stopped and a tonic substituted. The patient did not like this, and returned begging that the grindelia might be continued. It acted promptly as before and gave the patient relief. He felt so much better that he was going to Paris for a week's holiday."

The next is a case of spasmodic asthma treated with Grindelia robusta:

CASE III.—"Charles L., aged 47, a horsekeeper, wakes up in the morning about three or four o'clock with shortness of breath, which lasts twenty minutes or more. He cannot lie in bed, and often has to stand at the open window in his nightshirt. This has been going on without intermission for three or four years. He is afraid he will break a blood-vessel. Sometimes the attack ends in vomiting. He is fairly well in the daytime except that he can never eat any breakfast. Or-

dered an ounce of the liquid extract of Grindelia robusta, and told to take twenty drops in water three times a day, with an extra dose every quarter of an hour during the paroxysm. For the first two nights the patient was no better, but the third night he did not wake at all, but slept on till eight in the morning. It was the first night he had not been disturbed for a number of years. For the last three days he has been free from shortness of breath. The medicine was repeated for another week and the patient was seen at intervals for a month, but he remained perfectly well as regards the breathing."

INSOMNIA

AND ITS THERAPEUTICS

BY

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VII—33

INSOMNIA AND ITS THERAPEUTICS.

CHAPTER I.

THE PHYSIOLOGY OF SLEEP.

"I wish I could write a chapter upon sleep; it is a fine subject."—"Tristram Shandy."

"Life's nurse, sent from heaven to create us anew day by day."—READE.

As we cannot satisfactorily study sleeplessness unless we form some conception of sleep, it is proposed to review briefly a few points connected with its physiology, such as will assist in illustrating the pathology of the process. No attempt will be made to examine all the varied details of the subject, or to shed any new light upon the mystery in which it is still enshrouded; our task being the discussion of sleeplessness, and not the solution of the enigma of sleep.

Sleep, the familiar yet mysterious condition of repose in which our consciousness is in abeyance, received attention in the early days of Hippocrates and Galen; and ever since it has excited the interest of numerous careful and able investigators. Among these may be named Bichât, Binns, Blumenbach, Braid, Browne, Brown-Séquard, Brunton, Cappie, Carpenter, Cheyne, Denby, Dickson, Donders, Durham, Ehrlich, Ehrmann, Flemming, Fox, Foster, Granville, Hall, Haller, Hammond, Hartley, Holland, Jackson, Kohlschütter, Kussmaul, Landois, Lewis, Lyman, McKendrick, Macnish, Marvaud, Mitchell, Moore, Mosso, Obersteiner, Philip, Playfair, Pflügger, Ranke, Richardson, Salathè, Savory, Sieveking, Sommer, Tenner, Verheyen, Vulpian, Waller, and Willis. Each of these observers has added his quota to the general fund of knowl-

edge, while some have advanced theories which to them appeared to interpret the nature of sleep. No one of these explanations is as yet recognized as affording a satisfactory or final solution of the changes that distinguish a brain awake or functionally active, from one asleep or functionally tranquil. Their combined observations, however, particularly those made during the last thirty or forty years, have rendered tolerably apparent the nature of the modifications which occur in the brain in the course of sleep, whether these be causative, concomitant, or consequent. Notwithstanding their failure to unfold definitely the constitution of sleep, a careful survey of the accumulated facts will serve to indicate the character of the various pathological conditions which give rise to insomnia.

The Brain and Nervous System.

The condition of an animal asleep has been likened to "one robbed of its cerebral hemispheres," capable only of excito-motor acts. The nervous system, as a whole, is in a quiescent state; its functions are curtailed, and those which persist are carried on in a modified manner.

The psychical centres in the convolutions of the brain are functionally active during mental operations. These have not, like the motor centres, been definitely localized, but their physiological (if hypothetical) existence cannot be questioned; they embrace intellectual, emotional, and volitional centres. Activity originating in these is coincident with molecular changes in the cerebral cells, changes which are the sources of thought, emotion, and volition. The nature of the molecular metamorphosis is unknown, but that is no reason for doubting its occurrence. During sleep this molecular activity ceases, and simultaneously, mental operations are suspended, and consciousness and volition are in abeyance.

The endless variety in the character and complexity of our cerebral activities implies the existence of a like multiplicity of centres. These possess the most diverse functions, but all communicate one with another, by means of elaborate and intricate arrangements, and also with the special sensory and motor areas, so as to enable them to co-operate in a correlated manner. It follows, that during waking moments the whole

of these centres cannot be in action at one time; on the contrary, that a certain proportion must be in a state of repose. It seems probable that during sound sleep they are all at rest; if a limited number are active, light sleep and dreams are the result; if any considerable number are in function, sleep is rendered impossible.

The motor and sensory centres likewise subside into tranquillity; the latter becoming incapable of perceiving slight or ordinary sensations, while their corresponding nerves transmit impressions in a slow and imperfect way.

The great nervous centres in the medulla oblongata which are mainly concerned with the carrying on of respiration and circulation, are, so far as is compatible with life, asleep.

The spinal cord also is less active, and reflex movements can only be produced in response to more powerful excitations than would be required during waking moments, and these movements are slowly performed. This is probably due to the fact that spinal nerves transmit impressions during sleep in a languid and incomplete manner. Reflex impulses always bear some relation to the intensity of the excitation and to the depth of sleep.

The condition of the sympathetic nervous system during sleep is uncertain. It has not, as yet, been definitely ascertained.

Briefly summarized, during sleep the brain, ganglia, medulla, and cord are in a state of repose; and the work of the economy is conducted with the smallest possible expenditure of energy.

A good illustration of the extent to which this elaborate system is involved is to be found in the following remarks of Mr. Erichsen: "Those who are asleep at the time of the accident very commonly escape concussion of the nervous system. They may, of course, suffer from direct and possibly from fatal injury to the head or trunk; but the shock or jar, that peculiar vibratory thrill of the nervous system arising from the concussion of the accident, is frequently not observed in them, while their more wakeful and less fortunate fellow-travellers may have suffered severely in this respect."

Sleep the Time favorable for Recuperation.—Nervous activity, of whatever form it may be, is invariably attended by the consumption of the potential energy which exists in

nervous tissues; and also by a deposition of detritus in these parts, in quantities corresponding to the amount of work done. This activity is followed in a longer or shorter time by a feeling of exhaustion, which suggests repose, and is only relieved by sleep. So that during sleep, in addition to the fact that the functions of the nervous system cease, so far as it is possible, the products of its metabolism are excreted, and its potential energy is recuperated.

Onset of Sleep Gradual.—Bichât long ago pointed out, that "Sleep general was made up of many particular sleeps;" that it did not invade the whole of the organs at once, but that the cerebrum, sensorium, spinal cord, and the various organs and muscles must jointly and severally repose for sleep to be sound and complete. Excitability of one or more of these systems disturbs the repose of the whole body, and insomnia results. In this way we comprehend the importance of using daily all the separate parts in something like equal proportion if good sleep is to be secured.

Sleep is preceded by a series of indefinite and obscure sensations, which, collectively, are universally recognized as premonitory intimations that it is required by the body. It usually comes on gradually, one set of centres in the brain being obscured after another, generally in definite order, until all are involved.

The Motor Centres are first Invaded.—These are localized by Ferrier in the parietal and post-frontal regions. We find that one group of muscles after another becomes relaxed until the body assumes the horizontal posture; and finally real slackening of the muscular fibres is produced, nowhere better seen than in the diminution of tension which occurs in the firmly contracted muscles of a hemiplegic limb during sleep. The only exception to this rule is in the case of the sphincters, which remain contracted, although those of the eyelids occasionally fail to contract firmly, as some children sleep with their eyes partially open in health, and they more frequently do so when they are ill. (In disease, even in tetanus, the muscular system relaxes during sleep; although Professor Gairdner, of Glasgow, recently recorded, in a case of severe chorea, the remarkable, if not unique fact, that "the opisthotonic attitude was maintained even during sleep."—"Lancet," 1889.)

The motor centres in the brain fall asleep before those in the spinal cord, so that the normal inhibitory influence exercised by the former is for the time being in abeyance; and prior to the subsidence of activity in the cord itself, there is a tendency to spasmodic action of the muscles, causing exaggerated acts, and slight convulsive movements in the limbs or in the whole body. Sleep is the time most favorable for the exhibition of many of the vagaries of the nervous system which involve muscular movements; epileptic seizures, convulsive attacks, and certain reflex acts being of frequent occurrence.

Sleep next extends to the centres for psychical operations in the hemispheres of the brain; the will ceases to control the working of the intellectual faculties, and the powers of perception grow less; the mind, no longer inhibited from within or corrected from without, revels in absurdities, until at length all intellection terminates, or, at least, no knowledge of it is retained.

The centres for the special senses, each in its turn, and usually in the order enumerated below, become progressively inactive, failing to perceive sensations of an ordinary kind, while their special nerves transmit impressions feebly.

Professor Ferrier has thus localized the various sensory centres.

Vision.—That of vision is situated in the occipito-angular region. The eyelids close; the eyeballs turn upward and inward in the orbits, as if to exclude the light; and the pupils contract, the extent of this contraction being an indication of, and in ratio to, the depth of the sleep. External excitations, either through the skin or other sensory organs, cause the pupils to dilate to some extent, and that although the stimulation be so slight as to fall far short of awaking the sleeper. This phenomenon varies at different periods of sleep. An excitation, which during light sleep would suffice to awaken the sleeper, only causes dilatation of the pupils, during deep sleep.

According to Plotke, the pupils dilate widely in the act of awaking.

Oscillating movements of the eyeballs are common in children during sleep.

Hearing.—The centres for hearing, which are situated in

the superior temporo-sphenoidal convolutions, only respond to very pronounced sounds during sleep. This sense has been utilized for the purpose of estimating the depth of the process. Noises frequently, though not necessarily, prevent sleep; and loud noises often fail to arouse a sleeper, while an accustomed or expected noise or sound readily does so. For example, if an alarm-clock rings out, by accident, hours before it should do so, it awakens the sleeper at once. This is probably due to the channels and centres which convey and perceive familiar sounds offering less resistance to their transmission and reception, than those which conduct and register other sounds. Certain it is, that a sleeping dog will awake at the casual mention of his name in the course of conversation, which had not previously attracted his attention.

Monotonous sounds are not perceived after a time, the centres for hearing either getting accustomed to them, or their receptivity becoming lessened. Their cessation alone attracts attention: for instance, in night travelling it is usually the stopping of the train, or the interruption of the noise, that interferes with sleep. Such monotonous sounds as reading slowly in one tone of voice, the dropping of water, soft music, a pleasant murmur, have all been recommended as aids to sleep, and are of undoubted efficacy. Singing a lullaby and monotonously patting a child are the popular methods of wooing sleep. It has been proposed in America to court sleep by means of a humming-top worked by clock-work.

Smell.—The seat of this sense is probably in the tip of the temporo-sphenoidal lobe. For the keen perception of odors it is necessary that the fragrant particles should be dissolved in the mucous secretion of the Schneiderian membrane. Mucus is not secreted in any quantity by this membrane during sleep, and in consequence of its absence, the sense is so enfeebled that even offensive materials held to the nostrils fail to waken many sleepers, although cases have been recorded where abominable odors have awakened persons who were slumbering soundly; the stimulus, however, must be a powerful one. Upon awaking, the secretion of the Schneiderian membrane reappears, and the centre for smell resumes its function. Odors of various kinds prevent sleep; excessively minute particles of a volatile substance being capable of perception by the radicles of the olfactory nerve. In the case

of musk, for example, Kirke quoting Valentine states that $\frac{3}{100\,000\,000}$ of a grain can be so detected.

Taste.—This is localized in the region of the subiculum cornu ammonis. It seems probable that this sense is modified during sleep, though it is difficult to determine this with accuracy, as the conclusions are apt to be vitiated by the sense of touch. The secretion of saliva is arrested, and, if the nostrils are unobstructed, the mouth is closed.

Touch.—This sense is located in the hippocampal and neighboring temporo-sphenoidal regions. The centre being deeply situated in the brain, retains its activity longer than any of the others. Reflex acts can always be excited; their vigor depending upon the strength of the stimulus, the degree of sensitiveness of the part stimulated, and the depth of sleep.

The centres in the medulla, which are not entirely oblivious, work at the lowest rate of tension compatible with life.

Sleep having progressively included these various portions of the nervous system, it is said to be profound, and no act of volition can modify or terminate it.

If the inception of sleep be considered, it will be apparent that the centres situated highest in the cerebrum are the first invaded, while those at a lower level are successively included. This may depend upon the centres growing inactive consecutively (according to their position), and ceasing to attract a working supply of blood; or it may arise from the vascular supply of the centres becoming lessened, relatively to their distance from the heart.

The Effects of Sleep upon the Body.

The Circulation.—From the days of Hippocrates it was believed that the heart pulsated with greater force and frequency during sleep than in the waking state. But the reverse is the case. The pulse beats more slowly and less strongly while one is asleep, the number of contractions decreasing on an average from ten to twenty per minute; the same phenomenon is noticed in those who sleep by day and work by night. The recumbent posture accounts in part for this. Dr. Wilks, writing in Hilton Fagge's "Principles and Practice of Medicine," quotes Tufnell as having found that, in one patient, the difference in the frequency of the pulse was

thirty-five beats per minute, equal to fifty thousand in the twenty-four hours, in the lying as compared with the sitting posture. The really important factor, however, in the causation of the slowing of the pulse during sleep, is to be found in the weakened functions of the centres in the medulla, leading to diminished innervation of the heart, the arterial tension being at the same time lowered. This is more marked in children than in adults. The pulse is sometimes irregular in healthy children during sleep.

In pathological conditions, the pulse rate is diminished during sleep, the exceptions being in cases of great prostration without elevation of temperature, when its frequency may be accelerated. Owing mainly to the depressed state of the circulation, palpitation frequently comes on during sleep, and hemorrhages of various kinds are also apt to occur.

Respiration.—During sleep, the respiratory centres being in a comparatively inactive condition, the respirations number on an average four less per minute than at other times, the inspirations being shallower, and chiefly thoracic, owing to the inactivity of the diaphragm. On application of a stimulus which, though interfering with sleep, falls far short of awaking the sleeper, the respirations change in character, approaching more nearly those of the waking state; and when sleep actually terminates the breathing becomes deeper, quicker, and abdominal. The depth of sleep can be gauged, by noting the character of the respirations, and occasionally the rhythm becomes that known as Cheyne-Stokes without its having any special significance.

In diseases, the respirations decrease in frequency during sleep, though in cases of prostration, similar to those referred to in the last paragraph, they may become more rapid. Sleep is the favorite time for the onset of asthmatic seizures, and of croup, true and false.

It is always advantageous, when it is possible in illness, to estimate the pulse and respiratons during sleep, that the fallacies which are apt to vitiate the observations in the waking state may be avoided.

Landois and Stirling mention that the elimination of carbonic acid is diminished one-fourth during sleep, and ascribe it "to the constant heat of the surroundings (bed), darkness, absence of muscular activity, and the non-taking of food."

Pettenkoffer and Voit stated that of the total carbonic acid eliminated during twenty-four hours, 58 per cent is given off during the twelve hours of the day, and 42 per cent during the twelve hours of the night, while the quantity of oxygen taken in, during the twelve hours of the night, far exceeds that absorbed during the twelve hours of the day.

Temperature.—The temperature undergoes modification during sleep, both in children and adults, falling from 0.5 to 2° Fahr.: chiefly for two or three hours after midnight. It falls similarly during the day, in the case of those who sleep by day and work by night. Helmholtz states that a man weighing about twelve and a half stone gives off 40 calories of heat every hour while he is asleep, and 112 calories in the same time when he is awake.

The Secretions.—The secretory organs are less active during sleep. The conjunctival secretion and nasal mucus are greatly diminished in amount; if they are not, as in conjunctivitis and nasal catarrh, the eyelids are gummed together in the morning and the nostrils are occluded with mucus. The salivary and other secretions concerned with digestion are only formed under the influence of suitable stimuli, and these being absent during sleep they are not secreted. Absorption is slowly effected, consequently the action of medicines and poisons is retarded. The gastro-intestinal movements are either wholly in abeyance or greatly lessened.

The urine is secreted in smaller quantity, the amount being about a fourth of that secreted when awake; and the urea formed is decreased one-half during sleep.

Mendel found that urine secreted during the night contained a larger quantity of phosphoric acid than that secreted and passed during the day, showing that sleep is the most favorable time for the nutrition of the brain tissue and the removal of its waste products.

Bouchard, writing upon the toxicity of human urine, says that the urines of waking and sleeping differ not only in intensity, but also in quality; the urines of sleep being always really convulsants, while the urines of waking are only narcotics.

The secretion of milk continues during sleep.

Considerable difference of opinion exists as to the secretion of sweat; many eminent physiologists holding that it is de-

creased during sleep nearly 50 per cent, while Sir Dyce Duckworth and others, on the contrary, believe that it is increased during the night, on account of the greater quantity of blood found in the viscera and integument at that time. This would well explain the liability to catch cold from sleeping in a draught. Sleep is the chosen time for the profuse sweats of phthisis and frequently also of rickets.

The Depth of Sleep.

The depth of sleep varies considerably, even during different periods of the same night. It may be so light that consciousness is only momentarily obscured and the sleep terminable by the slightest external disturbance; or it may be so profound that activity in all the cerebral centres is suspended, and only the strongest external stimulations can interrupt it. External excitations acting on the sensory surfaces and centres have been made use of to determine the depth of sleep. Kohlschütter, by means of sounds of graduated intensity, found that this increased very quickly at first, and afterward more slowly until the end of the first hour, when it reached its maximum. It subsequently decreased quickly, and afterward more slowly, fluctuating from time to time until waking occurred. Several other observers have made experiments on this subject, but their conclusions do not differ materially from those of Kohlschütter. Attempts have also been made to estimate the depth of sleep by the modifications which the reflexes undergo. Rosenbach found that in the first period of sleep, when it was yet light, there was weakening of the reflexes, and contraction of the pupils; in the deeper sleep which followed, the abdominal, cremasteric, and tendon reflexes became abolished, and the pupils were fully contracted. Dr. Lauder Brunton writes: "In ordinary sleep reflexes disappear in the same order as in chloroform narcosis, but in mesmeric sleep the reflexes are increased as in narcosis from ether." He also writes: "According to Eulenberg, in chloroform narcosis the patellar reflex is abolished first, then reflex from the skin, then from the conjunctivæ, and lastly from the nose." "Narcosis by ether differs from that of chloroform in the much greater increase of patellar and other tendon reflexes, both in extent and duration." The writer can confirm these

observations, excepting that which refers to the state of mesmerism.

The Causation of Sleep.

As the causation of sleep from the earliest times has been supposed to depend in some manner upon alterations in the blood-supply of the brain, it will be useful to consider preliminarily some points in connection with these vascular arrangements, more especially as the cause of so many forms of insomnia is to be found in some interference with the normal blood-supply, either as regards quantity or quality, or both combined.

The nutritive arteries of the brain are divisible into two sets, the central and the cortical. The central arteries are vessels coming off from the main arteries near their origin and supplying the basal ganglia. The cortical vessels are distributed to the gray matter on the surface of the brain, and to the underlying subcortical substance, where they approach but do not anastomose with the central nutritive arteries. The gray matter is provided with a rich capillary plexus which brings to it a blood-supply five times as great as that of the white substance. All these arteries are terminal vessels—that is, they do not anastomose one with another, but each supplies independently a portion of the cerebral substance, thus providing for the simultaneous vascularization of separate limited areas according as they are called into play by the association of ideas.

During activity of the cerebral centres, the blood-supply of these centres, under the influence of the vaso-motor nerves, is increased—the increase in some cases, it is said, being from 30 to 47 per cent; on the other hand, when activity is lessened the blood-supply decreases. In other words, the blood-supply is coincident with, and in ratio to, the work being performed: ubi irritatio, ibi affluxus.

Many have doubted the possibility of increasing or diminishing the quantity of blood in the brain. The second Monro raised the question as to whether the brain could be congested at all; maintaining that, as it was shut up in a closed bony cavity which was quite filled (*i.e.*, with no vacuum), it could not be compressed. This led to the inquiry, Could the brain be depleted? Upon this point the observations of Monro,

Kellie, Donders, Burrows, Reid, and others, are well worthy of study. There is no longer any doubt that the quantity of blood in the brain varies very considerably under different circumstances, and that its distribution can be modified in divers manners; for example, the capillaries must necessarily become obstructed when the veins and sinuses are engorged with venous blood.

Variation in the quantity of blood in the cerebral vessels is made possible by the fact that the brain does not completely fill its bony cavity, part of the space being occupied by the ventricles and the subarachnoid and perivascular spaces, which contain the cerebro-spinal fluid. These communicate freely with each other and with corresponding structures in the spinal canal, so that when the brain receives an increased amount of blood, a certain quantity of cerebro-spinal fluid is displaced and compression of the brain avoided.

Luys went so far as to believe that the brain changes its position in the different postures assumed by the body.

The pressure of blood in the brain is so considerable that it causes movements of the brain, which give tracings similar to those obtained by the sphygmograph from direct pressure over arteries in other parts of the body.

Meynert, in his work on psychiatry, discusses fully the movements of the brain. Briefly stated, they are—Those communicated by the large blood-vessels at the base of the brain, and varying from sixty to eighty in the minute according to the pulsations of the heart. During systole of the vessels the organ is thrust upward toward the vertex and inward toward the ventricles, causing displacement of lymphatic fluid. Those which coincide with the movements of respiration, the brain rising with expiration and falling with inspiration. These movements, numbering fifteen to twenty per minute, operate mainly upon the sinuses, and, by compressing them, drive along the venous blood toward the heart. Those connected with the vaso-motor centre, and appearing as peristaltic movements occurring in the arteries at the rate of two to six per minute. These are the most powerful of all the movements, and more pronounced and regular during sleep than in the waking state. They are concerned in carrying off the waste products of the brain by establishing currents in the lymphatic fluids.

Professor Mosso, of Turin, conducted upon three persons (in each of whom a portion of the skull was wanting, permitting movements of the brain to be felt through the scalp) a series of experiments connected with the cerebral circulation, particularly during sleep. By means of special instruments he took tracings of the movements of the brain and thoracic walls, and of the pulsations of the heart, and of the radial artery at the wrist. He further devised the plethysmograph, by mean of which he estimated and registered the quantity of blood in the forearm and hand. And he showed (1) that in the act of going to sleep a dilatation and relaxation of the vessels of the forearm occur, with a corresponding contraction in the vessels of the brain, this change becoming most pronounced during deep sleep. (2) That all external stimulation, however slight, such as a ray of light falling upon the eye, a noise, etc., is attended by contraction of the vessels of the forearm, greater blood-pressure, and an increased flow of blood to the brain. (3) That these changes are accompanied by a modification of the respiratory rhythm, and an acceleration of the pulsation of the heart. (4) That during sleep the quantity of blood in the brain is subject to fluctuation without any apparent cause—these fluctuations in the blood-supply throwing some light on the observations of Kohlschütter regarding the depth of sleep, alluded to at p. 508; and (5) that all mental activity is attended by an increased quantity of blood in the brain.

These facts abundantly prove that the functional activity of the cerebral cells regulates the blood-supply of the brain in health, and that it plays a most important part in the production of sleeplessness.

Until recent years sleep was believed to depend on a determination of blood to the brain, on account of its supposed resemblance to coma, a condition in which the veins and sinuses are engorged with blood, the nervous centres congested, and the activity of the cerebral cells suspended. These conditions have, however, nothing in common; sleep being a healthy and physiological condition, coma an unhealthy and pathological state, though, in some diseases, the one glides imperceptibly into the other. Many facts have been adduced in support of the hyperæmic theory. It has been urged that men of full habit of body and prone to stoutness are usually

good sleepers; but if anything is certain in medicine, it is that hyperæmia of the brain is incompatible with good and refreshing sleep in health; and also that all diseases that are accompanied by that pathological condition are invariably attended, at the onset, by sleeplessness and restlessness. Dr. Fox, writing on insomnia, mentions that Chapin held nitrite of amyl to the nostrils of sleeping people, with the invariable result of awaking them in one or two minutes; while it has been noticed that workers in the manufacture of nitro-glycerin suffer from throbbing carotids and sleeplessness; and every surgeon who has tried to put a patient under chloroform while he was asleep can testify to the difficulty of doing so without awaking him.

The belief, however, that the brain was congested during sleep prevailed, in spite of numerous observations (chiefly upon the movements of the brain), which, so far from tending to support the hypothesis, went a long way to prove that, during sleep, the brain contains less blood than when awake. It had frequently been noticed that the fontanelles in young children fall below the level of the skull during sleep, rising again when waking occurs—a fact not to be explained on the hyperæmic theory.

About two hundred years ago, Philip Verheyen, the Regius Professor of Surgery in the University of Louvain, propounded the theory in his work on anatomy, that sleep was due to the cessation from work of the majority of the external senses, and that these contained certain essences (spiritus) which passed into the blood, so that the "greater portion of the medullary substance subsides or contracts," and that, after sleep, these rush back into the brain "to swell it up, so as to cause awaking"—and further, that when these essences did not leave the brain, dreams resulted. (Haller and Boerhaave adopted the hypothesis of animal spirits, supposing that these were gradually expended, and so used up during the waking state, and that they were restored during sleep. The former believed that the passage of the spirits through the brain was impeded either by a deficiency or immobility of the spirits, or by compression of the nerves. The latter thought sleep due, either to the obstruction of the secretion, or to an altered circulation of the nervous spirits. Cullen compared the natural states of waking and sleeping to excitement and collapse, a

theory which pervaded many of his writings, being known as the theory of excitement. He believed that the quantity of nervous fluid was equable, but that during waking it moved with greater, and during sleep with less, vigor. He likewise thought that during sleep the movements in the brain diminished, and that a degree of collapse took place; while during waking excitement was the normal and necessary condition.) This statement seems to be wonderfully near the truth, though expressed in an antiquated phraseology.

Blumenbach ascribed sleep to "a diminished or impeded flow of oxygenated or arterial blood to the brain." In 1817 he recorded the case of a young man under his care whose skull had been trepanned, and in whom the brain decreased in size during sleep, and increased when he awoke.

Dr. Hammond noticed that the same thing happened in the case of a man with a large opening in the skull, the result of a railway accident; and he devised an instrument which demonstrated and measured the extent of the cerebral pressure. The late Dr. C. H. Moore wrote that the same "observation was made in Montpellier a century ago in a similar case, and it was noted that the brain rose and fell in proportion to the lightness or profoundness of sleep." Many distinguished surgeons have since recorded cases, in which the skull being defective, the convolutions of the brain have been seen to become bloodless, and to subside below the level of the skull during sleep.

These observations led to further inquiries, the chief of which will now be referred to. Donders, in 1854, performed some experiments on a dog, trepanning its skull and substituting for the bone a piece of glass, when he found that during sleep the brain became anæmic. Similar experiments were subsequently carried out by Ehrmann in an improved manner with like results, and these have since been frequently confirmed by others.

In this country, Mr. Durham, in the "Guy's Hospital Reports" for 1860, placed upon record a series of observations he had made upon dogs, in all of which the greatest care was taken to insure accuracy. Portions of the skull were removed under chloroform, the dura mater clipped away, and pieces of glass secured in the openings by means of Canada balsam. He noted that during sleep the brain became pale and anæmic,

and sank below the level of the skull, the amount of blood in the veins being reduced. The appearances presented by the brain during its periods of activity differed remarkably from those observed during sleep. He found further, that on inducing an experimental hyperæmia of the brain by tying the jugular veins, the vessels of the pia mater became congested, while the animals fell into a state of torpor, but not of sleep. He summarized his observations in the following deductions:

"Pressure of distended veins upon the brain is not the cause of sleep, for during sleep the veins are not distended; and when they are, symptoms and appearances arise which differ from those which characterize sleep.

"During sleep the brain is in a comparatively bloodless condition; and the blood in the encephalic vessels is not only diminished in quantity, but moves with diminished rapidity.

"The condition of the cerebral circulation during sleep is, from physical causes, that which is the most favorable to the nutrition of the brain tissue; and, on the other hand, the condition which prevails during waking is associated with mental activity, because it is that which is most favorable to oxidation of the brain substance, and to various changes in its chemical constitution.

"The blood which is derived from the brain during sleep is distributed to the alimentary and excretory organs.

"Whatever increases the activity of the cerebral circulation tends to preserve wakefulness; and whatever decreases the activity of the cerebral circulation, and at the same time is not inconsistent with the general health of the body, tends to induce and favor sleep. Such circumstances may act primarily through the nervous or through the vascular system. Among those which act through the nervous system may be instanced the presence or absence of impressions upon the senses, and the presence or absence of exciting ideas. Among those which act through the vascular system may be mentioned unnaturally or naturally increased or decreased force or frequency of the heart's action.

"A probable explanation of the reason why quiescence of the brain normally follows its activity is suggested by the recognized analogical fact, that the products of chemical action interfere with the continuance of the action by which they are produced."

In 1866 Drs. Hammond and Weir Mitchell conducted a series of experiments upon dogs under the influence of chloroform and opium with practically the same results.

It seems, therefore, to be conclusively demonstrated that sleep is not due to a plethora of blood in the brain.

The late Dr. C. H. Moore, in his essay on the "Physiology of Sleep," ascribed to the ganglionic nerves the important function of constricting the arterial vessels of the brain, and so inducing an anæmic condition which temporarily suspends cerebral activity. Support was gained for this view when Dr. Flemming showed, by experiments upon himself and others, that a state resembling sleep could be immediately produced by compression of the carotid arteries. It was, however, pointed out that the resulting condition was one of syncope, and not of sleep.

Dr. Cappie, in his admirable essay on the "Causation of Sleep"—a work well worthy of perusal—states that among other causes there is an increased quantity of blood in the veins of the pia mater which exerts a certain amount of pressure on the gray matter of the brain; adducing, in support of this opinion, the evidence of Dr. Hughlings Jackson, who, in ophthalmoscopic observations made upon sleeping children, found the retinæ paler, the arteries narrower, and the veins more dilated than during the waking state. He also cites the statement of Dr. Allan Jamieson, now of Edinburgh, who reported that in a girl in a state of trance he found the retinæ pale, the arteries small and hair-like, and the veins full and large. Such evidence, however, loses much of its value when the appearances are found to be inconstant. Senator has recorded that the ophthalmoscopic appearances were normal in a case of prolonged sleep which extended over some months. Indeed, it is extremely doubtful whether ophthalmoscopic observations are of much utility in such an investigation; for Dr. Gowers, in his work on "Medical Ophthalmoscopy," in discussing anæmia and hyperæmia of the brain, writes: "It has been supposed that the state of the circulation in the eye and brain corresponds, and that the anæmia and hyperæmia of the brain are revealed by similar conditions in the fundus oculi. But, as has been already said, such a statement, if true at all, is true only within certain narrow limits. The intraocular tension so regulates the state of the vessels of the eye,

that very little alteration occurs in them, when changes occur in the condition of the vessels of the brain." In referring to cases of anæmia Dr. Gowers says: "It is possible that the initial stage of an epileptic fit, which is attended by pallor of the face, may be accompanied by pallor of the disc, and perhaps spasm of the retinal arteries; but very little evidence of this fact has at present been obtained."

Moreover, it must be borne in mind that the very fact of examining the eye is sufficient to modify the circulatory arrangements of sleep. It has been already stated (p. 503) that external stimuli of all kinds induce changes in the pupil in healthy subjects; and it has also been shown (p. 511) that they produce alterations in the circulation of the brain; nay, more, that the fact of throwing a light on the closed eye is sufficient of itself to bring about these modifications. It is therefore evident that ophthalmoscopic observations made during sleep must of necessity be of doubtful value; certainly their importance falls far short of those conducted in the waking state.

Dr. Cappie takes exception to Mr. Durham's conclusions, already quoted, alleging that atmospheric pressure would empty the veins of the brain, and so vitiate the results.

Vulpian, the distinguished physiologist, adopted the same view, believing that atmospheric pressure and the effects of anæsthetics and narcotics are important factors in the changes observed in the experiments of Durham and Hammond. He further expresses his dissent from Dr. Cappie's proposition, on the ground that the mere displacement of blood from the arteries to the veins cannot exert pressure on the nervous tissues.

There is also difficulty in accepting Dr. Cappie's view on the further ground that blood in the veins is useless for nutritive purposes, and as sleep is highly restorative, it is difficult to conceive how depuration and recuperation can be effected under such conditions. Certainly, passive congestion of the brain has never been deemed favorable for its nutrition, or for sleep.

Vulpian holds the opinion that the state of the circulation of the brain has little to do with the causation of sleep, the vascular and cardiac modifications being only accessory to it. He further points out that the carotid and vertebral arteries in the lower animals have been tied so as to cause profound

anæmia of the brain, without the animals being made appreciably drowsy.

Professor Mosso demonstrated that in the act of awaking the brain undergoes a diminution in volume and contains less blood than during sleep; this would appear to be coincident with the sudden dilatation of the pupils (p. 503). Professor Mosso thinks that this shrinking is "sufficient to render untenable the hypothesis which attributes sleep to a state of anæmia of the brain." This does not necessarily follow. Severe and sudden anæmia is productive of convulsions; a less intense form, of sleeplessness and restlessness. It is therefore suggested as probable that this abrupt depletion may be nature's method of securing awaking. The effects which anæmia produces vary very greatly in different cases, and appear to depend largely upon the degree of the anæmia and the mode of its induction.

Slight and gradual anæmia of the brain is conducive to sleep. There is abundant evidence to prove that mental inertia and somnolence manifest themselves when the brain is gradually deprived of its normal blood-supply. Dr. Buzzard has recorded, in his work on "Diseases of the Nervous System," instances of somnolence in cerebral syphilis lasting several weeks, which he states were probably due to arterial disease, and which recovered under specific treatment. In such cases the circulation must have become lessened very slowly, and must therefore have been causative of, and not dependent on, sleep.

The thyroid gland plays an important part in the regulation of the vascular supply of the brain, preventing too great a flow to, but, particularly, from it. The extirpation of this gland has led in many instances to mental lethargy and somnolence.

Cases of "sleeping sickness" have occurred chiefly in Western Africa, characterized by swelling of the cervical glands and a gradual and increasing inclination to sleep. The pathology of this disease is not known, but Dr. Gore recorded the post-mortem appearances in such a case ("British Medical Journal," 1875), from which we can gather that the brain was abnormally bloodless: "The substance of the brain was particularly firm, and not one drop of blood appeared on a section of any part of it; the sinuses were unusually deficient in the

quantity of blood." Less striking but more familiar instances of the fact that a moderate depletion of the brain favors sleep, are to be seen in the drowsiness which follows the partaking of a full meal, and after a hot foot-bath.

Some have suggested that the quantity of blood in the brain is not decreased at any one time during sleep, although the total amount circulating through it in the course of an hour may be much less than during an equal period in the waking state, thus ascribing the causation of sleep to the slowing of the pulsations of the heart. The writer is satisfied this is not the explanation, as from observations he has made upon persons going to sleep, and upon those drowsy after meals, he has ascertained that the pulse does not fall very materially until sleep ensues. Indeed, after meals the pulse is frequently accelerated, so that while the brain is deprived of blood, through contraction of its vessels, the volume sent is transmitted more quickly. Of course it must be admitted that the very fact of instituting these examinations may have disturbed the vascular arrangements.

From these remarks it seems obvious that the cause of sleep is not to be found solely in the cerebral vascular supply. There is much truth in the statement of Sir J. Crichton Browne that "The blood-vessels were clearly made for the brain, and not the brain for the blood-vessels; and the amount of blood-supply to the brain and its several parts is determined, not by vascular domination, but by the functional activity of the nervous tissues." Nevertheless, the vascularization of the brain is of the highest importance, and in connection with sleeplessness it must be studied most narrowly.

Waste Products.—It is necessary, before going further, to say something regarding waste products, seeing that they have been credited with sleep-producing properties. J. Ranke, many years ago, pointed out that muscle is weakened by work; and that by the exhaustion of its store of oxygen, and the accumulation in it of the products of disintegration (chiefly lactic acid and creatin), it loses its contractile power and becomes feeble and incapable of more work. During rest the agents of fatigue are removed, the oxygen restored, and the muscle once more becomes capable of doing work. In proof of this he showed that a muscle into which lactic acid is injected becomes enfeebled, as if by exercise, and requires rest

and the removal of the noxious agent for the recovery of its normal condition.

Preyer, applying the same reasoning to the nervous system, attributed sleep to the using up of oxygen and the accumulation of waste products—ponogenes, as he called them —in the brain and nervous system. He says: "During an active condition of mind and body, certain substances are brought into existence which are not found (at all events very sparingly) during a state of rest: lactic acid, for example, and creatin. These latter substances may accumulate in the blood, and as they have a great affinity for oxygen, they appropriate a principle required for active exertion. The first stage of this accumulation characterizes fatigue, the second stage gives rise to sleep, and the third, when oxidation has been completed, is followed by awaking." Preyer, however, adds that the artificial introduction of lactic acid, or of the lactates, into the system has not always been followed by sleep. This failure of the lactates to produce sleep has been noted by many others. According to Ehrlich the products of cerebral cell activity are acid.

While waste products may be a factor, sleep is not to be explained on such grounds solely: they do not account for the tendency to sleep while travelling by rail in hot weather, and other similar facts, as sleep thus induced bears no relation to the amount of mental work done.

Again, idiots, the feeble-minded, and even healthy persons whose brains are inactive, sleep much longer than active-minded men: this is due to the bloodless condition of their brains, and not to their need for recuperation. Cases have been recorded from time to time of persons sleeping during several days, without it being suggested that they had made any severe calls upon their intellectual apparatus.

Vital Alkaloids.—Last year Professor Leo Erraro, of Brussels, in an elaborate essay founded chiefly upon the physiological work of Professor Gautier and others, raised the theory that sleep is due to the manufacture in the body of vital alkaloids—leucomaïnes—basing his arguments mainly upon the fact that G. Pouchhart and Bouchard had found alkaloids in human urine (p. 507), and that Gautier had discovered in human saliva, alkaloids which were venomous or narcotic, at least to birds. He states in further proof of his theory that

Gautier has shown that creatin leucomaïnes exert a powerful influence upon the nervous centres, producing drowsiness and fatigue, and at times purging and vomiting. Erraro compares the action of leucomaïnes to that of narcotics such as morphine, and supports the comparison by stating that "Reburk and Van Dissel assure me that of forty-two vegetable alkaloids known to them, only morphine partakes with ptomaïnes the property of forming Prussian blue, by the reduction of the perchloride of iron and of the ferricyanide, and this in spite of the presence of an oxidant as energetic as anhydrous chrome." Leucomaïnes for the most part, according to Gautier, resemble ptomaïnes in being highly oxidizable. Morphine is also easily oxidized. He deduces from the above data that muscular and cerebral work result in waste of the muscular and cerebral tissues, and that these waste products take the form of leucomaïnes, which, by accumulating, cause a sensation of fatigue, and intoxicate the superior nervous centres to the point of inaction, which is equivalent to sleep. During sleep these products are slowly oxidized, and when the oxidation is completed waking ensues.

Dr. A. M. Brown, in his work on "Animal Alkaloids," in discussing the observations of Gautier and Bouchard on the toxic qualities of the human saliva and urine respectively, dwells upon the toxic narcotic quality of the saliva and urine eliminated during the day, and the convulsive quality of the urine secreted by night. He refers to Hougeney's suggestion that the night saliva of man may also be convulsive, and adds: "It would certainly be remarkable, if true, to find the alkaloid, in the interrupted succession of physiological effects, guaranteeing, as it were, the alternation of sleep and wakefulness."

The Oxygen Theory.—A. von Humboldt, toward the end of the last century, propounded the idea that sleep is due to the want of oxygen; and Dr. (now Sir Lyon) Playfair, nearly half a century ago, pointed out that everything which robs the brain of oxygen conduces to sleep. Since then, the subject has never failed to receive attention; and the theory advanced by Humboldt has also been upheld by Sommer, who refers in support of his statements to the observations of Pettenkoffer and Voit briefly alluded to on p. 507.

This is well exemplified in the drowsiness which affects a congregation in a badly ventilated church. (In former years,

when less attention was paid to the renewal of the air in places of worship than is customary at present, the pew-openers were armed with long poles, having a fox's tail attached to the one end, to tickle the faces of the slumbering females, and a hard knob at the other end, to awake the sleeping males, by striking them over the head!)

Pflügger in 1875 showed that the brain is extremely sensitive to the want of oxygen (thereby confirming Dr. Playfair's statement), and that when frogs are deprived of it for any length of time they gradually fall into a condition resembling sleep. He believed that the activity of the psychical cerebral cells depends upon the quantity of intra-molecular oxygen they contain; and that, in the gray matter particularly, all function is attended by oscillating or explosive movements in the cells, these movements being caused by the combination of the oxygen therein contained with certain carbonaceous particles in the tissues, oxygen disappearing and carbonic acid being formed. If these movements continue to use up oxygen at a greater rate of speed than the circulation can replace, a time comes when the cerebral cells suffer from the want of oxygen and the accumulation of carbonic acid; the explosive movements, meanwhile, growing more and more feeble, and psychical operations more and more debilitated, until eventually sleep ensues.

In this connection it must be remembered that the nervous tissues derive their oxygen from the blood, and that when the blood is deficient in oxygen-carrying corpuscles, these textures suffer to the same extent that they would from an atmosphere defective in oxygen; and being semi-starved they grow irritable and hyper-sensitive.

The absence of external stimuli, such as exists in the darkness and quietness of the night, has been advanced as a cause of sleep, and not without reason. Strümpell, for instance, recorded a case of a girl of sixteen who became almost entirely anæsthetic, so that she was unable to perceive the most violent stimulation of the skin and mucous membranes, while the muscular sense and even the sense of muscular fatigue were lost. Relations with the outer world were preserved by two channels only—the right eye and the left ear—and if the eye was bandaged and the ear plugged she fell asleep in a few minutes. She could be awakened by stimuli acting on the

eye or ear, but if left alone she awoke naturally, in response, apparently, to the action of some internal stimulus.

Periodicity.—Sleep has also been attributed to the law of periodicity which governs all natural things. In the vegetable world these periodic changes are well seen, the growth of plants being more rapid during the night than during the day, while the leaves of many of them assume different postures during the alternating periods of growth and rest, as Linnæus first pointed out, and that although the plants are shut up in a room from which all light is excluded. In the animal kingdom the same periodicity is observed as regards rest and work, and this holds good even in the case of those centres in the medulla oblongata which apparently never slumber—those, namely, which preside over the circulatory, respiratory, alimentary, and other systems. There is, for instance, a period of rest between every expiration and inspiration; the gastro-intestinal operations are carried on intermittingly; while the heart has also ample time for rest. Dr. Yeo writes: "If we assume the human heart to beat some seventy times a minute, each cycle would occupy about eight-tenths of a second, which would be made up as follows: auricular systole = one-tenth of a second, ventricular systole = three-tenths of a second, while the pause (or rest) would equal four-tenths of a second." This rhythmic repose is greater during sleep, when the heart beats more slowly, so that the heart enjoys nearly twelve hour's rest out of every twenty-four. In like manner the nervous system, being constantly employed during waking hours, requires periodic repose, which it can only obtain during sleep. While this explains the need for sleep, it throws no light upon its causation.

Sleep by Suggestion.—Considerable attention has been paid of late years to hypnotism, and many observers believe that natural sleep is due to self-hypnotism—that a man suggests to his mind "sleep," goes to his bedroom for the express purpose of sleeping, and sleeps by "suggestion." Many arguments are advanced to support this view; one being that if a man wishes to rise at a particular hour in the morning he suggests to his mind before falling asleep that he must awake at that hour, and frequently does so.

Dr. Brown-Séquard lately propounded a theory that sleep is due to an inhibitory act in the nervous system.

These last two theories appear to be quite untenable.

Having now stated at some length several of the theories as to the causation of sleep, it only remains to reiterate the remark made in the opening sentence, that no one of them can be accepted as settling the subtle problem. Whatever may be the immediate cause, the need for sleep is well explained by the fatigue of daily toil, in which waste products are manufactured quickly and energy is expended, and that a time of rest is required for the removal of the one and the recuperation of the other.

Dreams.

No account of sleep would be complete which did not embrace the subject of dreams; for it is only by reviewing the two subjects in connection with each other that any comprehensive acquaintance with either can be gained.

It is highly probable that all animals possessing brains dream. Dogs and other animals frequently give evidence of this in their sleep by noises and movements which testify to activity in the cerebral centres. Lucretius believed that dogs hunted in their sleep. That their dreams are not always pleasant is indicated by their awaking suddenly in a state of agitation. It is well known that animals suffer—like the genus homo—from nightmare and somnambulism, while they can be readily hypnotized.

Dreams are manifestations of partial or disturbed sleep, and show that there are unequal degrees of activity in the psychical centres, some having abdicated their functions in slumber, while others are in varying degrees of activity. Those which are asleep no longer guide and rectify the working of those which are awake or partially awake. It seems likely that the active centres, besides being divorced from those asleep, enter into unusual associations, which result in distorted functions—*i.e.*, in disjointed and absurd aberrations of thought. During waking moments thoughts and actions are under the direction of the will, our highest faculties being employed to guide them. Throughout sleep the will is dethroned and sensibility suspended—that being the essence of sleep. It follows, necessarily, that the will can no longer dominate thought and movement; and if we recollect that the active psychical centres are uncontrolled by those which are

asleep, while their activity is disorderly and their operations are badly correlated, we can well understand how our dreams run on without rhyme or reason.

It has been suggested, with every probability of truth, that when many centres are active, dreams are consistent and coherent, while when few centres are working they are unreal and extravagant; stated briefly, the difference in the quality of dreams appears to depend on the depth of sleep.

Dreams occur most frequently at the commencement and termination of sleep, the inequality in the state of the cerebral centres being the condition necessary and suitable for their development. They are of importance to the physician in indicating some disturbance in the economy which might otherwise pass unnoticed: *e.g.*, they are frequently premonitory symptoms of apoplexy and phthisis pulmonalis, and they may be excited by sensations due to dyspepsia, which are transmitted to the brain. In many instances dreams bear some relation to their exciting causes: Maury's observations upon himself in reference to this subject are well worthy of study. Dreams occasionally exert such a powerful influence upon the mind as to leave permanent impressions, and that in men and women of the strongest intellect and the greatest courage—people who would be ashamed to confess the fact, even to themselves.

Dream-laden sleep is never refreshing; persons who dream much rise in the morning as tired as when they went to bed. The brain as a whole is not rested while intellectual operations continue, and its hyperæmic condition is unfavorable for its nutrition.

Somnambulism, or sleep-walking, occurs when the centres of consciousness are asleep, the motor centres being awake or active. Uninhibited by certain psychical centres, the sleep-walker's muscular sense is apparently increased, enabling him to walk about and perform feats which he would not, in his waking moments, undertake. He does not see, hear, or smell; he is wrapt up in the dream he is acting, and seldom recollects that he has walked during his sleep. To this subject we shall recur.

Hypnotism.—Three conditions are described: the lethargic, the cataleptic, and the somnambulistic, the latter being a state of artificial somnambulism. The condition has been

recognized from the earliest ages. Mesmer, in the middle of last century, gave an impetus to its study; Mr. Braid, of Manchester, directed much attention to it about 1843; and of late years it has been extensively studied by Charcot, Liébault, Heidenheim, and others, being largely used on the Continent as a means of cure by "suggestion." Mr. Braid showed that a person fixing his attention steadfastly upon a luminous or dark object held a little above and in front of his eyes, so as to produce a convergent and superior squint, fell into a deep sleep, during which he was powerless to change his condition, except at the instigation of the operator. It is necessary, however, that the mind should be concentrated upon the object and the will wholly surrendered to the influence of the operator. Hypnotism can be produced in many other ways, but as no reference will be made to it as a means of treating insomnia, it is not necessary to consider it in more detail.

CHAPTER II.

GENERAL REMARKS ON INSOMNIA.

THE word "insomnia," which signifies the want of sleep, is used, popularly, to indicate any interference with the depth or duration of that condition; and it is in this wide sense that the word will be used in these pages.

Insomnia is an evidence of vigilance in the cerebral cells, initiated and maintained by some perturbing element in the system, of which it may be the sole symptom. It is thus designed to subserve a highly conservative purpose. In some instances it attracts attention to ailments that might otherwise elude detection; while in many cases it is a necessity for the preservation of life, as, for example, in some diseases of the heart and lungs, in which consciousness is required for the maintenance of respiration.

It is not a disease, but a symptom of many diseases, differing widely in their nature and complexity, as well as gravity. It is associated equally with trivial ailments and with affections which jeopardize life. Its severity and persistence is no guide to the diagnosis of the disturbance upon which it depends, for in such important lesions as organic diseases of the brain it may be absent, while it is a frequent and obstinate symptom in such prevalent affections as the functional derangements of digestion. Again, diseases which are wont to give rise to insomnia cannot be said to do so uniformly or constantly. A disease may produce it in a pronounced form in one patient, in a modified degree in a second, and not at all in a third; and it may originate it in a patient at one time and not at another. The wakefulness appears in every case to be influenced and biassed by the condition of the nervous system, the temperament of the patient, and by the state of the general health at the time.

In many severe diseases, *e.g.*, typhus fever, sleeplessness *per se* endangers life, by increasing the enfeeblement and ex-

haustion at a critical juncture, when a refreshing and quiet sleep would conserve the limited store of strength the patient possesses. In cases such as these we are justified in ranking sleep as a powerful curative agent, and sufficient, of itself, to determine recovery.

In less important disorders in which insomnia is an unyielding symptom, it is not only the source of much misery and discomfort, but it entails upon the sufferer a grievous hardship, in that he has to fight the battle of life in a maimed condition. Deprived of the nightly restoration of his potential energy, his brain grows weary, and his whole mental and physical vigor becomes impaired; and if, in these circumstances, he persists in striving to work, he encroaches upon his fund of reserve force to such an extent as to lead eventually to the bankruptcy of his nervous system. A man's power of work is intimately related to his ability to sleep, and there is no more reliable indication of sound health than the capacity to sleep naturally.

Sleep has been called "the chiefest thing in physic." As a restorative, it has neither substitute nor rival; it is co-equal in importance with food and clothing for the preservation of life.

It will materially assist us in the clinical study of insomnia if we consider, further, certain physiological and pathological facts appertaining to sleep.

First of all we may predicate that sound nervous structures, properly nourished, adequately rested, and rightly exercised, are fundamental desiderata for good sleep; and on the other hand, that all circumstances interfering with the health, nutrition, repose, and working of the nervous textures are detrimental to sleep. Let us glance very shortly at these points.

Sound Nervous Structures.—These comprise typical cells of stable character, normal nerve fibres, neuroglia, blood-vessels, pericellular and perivascular spaces, etc. We propose to refer to the first two essentials only, the cells and their connecting nerves, as the remarks regarding them will suffice to illustrate the fact that any defect in one or more of these structures must of necessity disturb the harmonious working of the others, and initiate disordered function; while they will exemplify the truth of the old saying that "a chain is no stronger than its weakest link."

Cerebral cells vary very considerably in their construction, size, and shape according to the special functions they subserve. For example, some possess the power of perceiving and registering impressions transmitted to them, and others of emitting special and individual impulses which they have originated. These functions, whether psychical, sensory, or motor, necessitate a faculty for storing up nervous or potential energy and discharging it in response to normal stimuli —a capacity distinctly characteristic of their health.

Cerebral cells differ greatly in the degree of stamina they possess. They are so inherently strong, in some persons, as to be able to resist in a great measure the effects of work and strain; while, primarily or congenitally feeble, or secondarily debilitated by unhealthy conditions in others, they are vulnerable and soon break down under the wear and tear of every-day life. They display their enfeeblement in an incompetency to accumulate nervous force, and in discharging it in response to trivial excitations. Such cells, in short, are irritable and impressionable, and thus liable to disturb sleep.

Some cells have their functions so perverted by imperfect nourishment and other causes that they originate erroneous sensations spontaneously; for example, in hypochondriasis.

Unrest in the cerebral cells is perpetuated by faulty conditions inherent in themselves; by sensations conveyed to them, whether from the interior or exterior of the economy; and by an altered state of nutrition, an exciting cause which will be considered in detail under the section on normal metabolism.

All diseases interfering with the integrity of the cells are apt to lead to modifications of sleep. When organic, they usually cause insomnia in the early stages; in the later there is often the reverse condition of coma. When functional, as from continued psychical operations, they are invariably attended by insomnolency.

When activity is excited in the cells by perturbing sensations originating in distant parts, the sensations are transmitted by cells at the distal extremities of the nerves or nerve endings, cells which exist in every portion of the mucous and cutaneous surfaces, as well as in the deeper structures, and which vary in size and shape according to the special function that they subserve. These terminal cells transmit different sensations too numerous to specify, but those of light, sound,

and pain, and of hunger and fatigue, may be mentioned to indicate the diversity of their functions.

Each description of cell, however, practically acts in a similar manner, receiving and transmitting its own particular kind of sensation to its own special centre in the brain. For example, the terminal endings of the auditory nerve can only receive and transmit impressions of sound, and these must reach the centre for hearing before they can be recognized. All conditions (such as diseases affecting the periphery, organs, viscera, etc.) implicating and interfering with the integrity of these terminal cells, render them irritable and liable to project impressions arising from insignificant causes.

Nerve fibres of varying structure connect the cerebral and peripheral cells. For their efficient function they are dependent upon the integrity of the cells they represent. When the cells are faulty, the nerves participate in the irritability, and convey trifling impressions in an amplified manner. This is well exemplified in the exaggerated reflexes in some neurasthenic conditions, and still more palpably when degeneration has followed destruction of the cerebral cells, as in hemiplegia.

In health, sensations thus conveyed to the cerebral cells arouse activity which is incompatible with sleep, for their perception in the various centres in the brain induces in them a concurrent hyperæmia, an occurrence to which we must revert at some length immediately.

For instance, an excess of light in a bedroom, such as proceeds from a fire, or in summer from the early morning light, often prevents sleep. To many, complete absence of light is an essential condition for sleep. It is recorded that Napoleon I. (to whose sleeping powers reference will hereafter be made) could only fall asleep in total darkness.

Noises, too, not necessarily loud, but out of place, act in like manner on a limited number of persons. One constantly reads in the newspapers of actions being brought against the owners of dogs and poultry, by people whose early slumbers are disturbed by barking and cock-crowing. Certainly, many persons have their rest disturbed for some time after coming to town from the country, and others cannot sleep with a clock ticking in their bedroom.

Smells occasionally hinder sleep, although they are seldom capable of interrupting it. Of the power of smells to hinder

sleep, the writer recently had practical experience while travelling in a sleeping carriage, the musty, dusty odor of the mattress rendering it impossible.

Pillows of hops, wormwood, mandrake, henbane, and poppy capsules were used in olden times as aids to sleep; more recently, those composed of the flowers of the lime tree and of the leaves of the blue gum tree have been recommended. Neither of these has been found reliable, the writer believes, because their odor not infrequently prevents sleep.

Many enfeebled persons are extremely sensitive to odors, and are apt to be kept awake by trifling effluvia. They are equally susceptible to insignificant noises and other sensory impressions which in health they would not heed. Their complaint that they cannot sleep for reasons which appear to be paltry seems to be well-grounded, as they sometimes get to sleep quickly when the source of disturbance is removed.

Taste may also thwart sleep. For example, since cascara sagrada has come into general use as a purgative, many patients have complained that its taste kept them from sleeping.

Painful sensations are able both to prevent and to interrupt sleep. It is practically the same wherever the pain arises, whether central, peripheral, or in the course of the nerves, the pain being referred to the terminal branches of the nerves. Sensations far short of pain, such as those arising from cold feet, and from the irritation of eczema, pruritus, etc., or perverted sensations, as formication, are all able to prevent or, if already induced, to terminate sleep. In skin affections, sleep, good or bad, is intimately associated with improvement or the reverse in the progress of the disease.

Sleep is the chosen time for the onset of many painful affections, such as the passage of biliary and renal calculi, and many diseases having "algia" as the terminal syllable of their names. It is also the time when neuralgic, syphilitic, and other pains become aggravated.

Normal Metabolism.—Insomnia, from whatever source, is so constantly associated with perverted cerebral vascularization, that for all practical purposes we may conclude that, primarily or secondarily, it is excited and maintained by an alteration either as regards the quality or the quantity, the access or the egress, of the nutritive fluid.

Healthy cerebral cells require for their recuperation and

depuration a normal blood-supply. They are extremely sensitive to all interference with their nourishment. For example, they speedily evince the effects of imperfectly oxygenated blood in headache and drowsiness, and still more permanently the consequences of an impaired metabolism in irritability by day and sleeplessness by night. In the course of this work we shall require to consider this subject fully in connection with the sleeplessness which occurs in the various fevers and cachexiæ, and in gout, syphilis, etc.

Cells inherently weak manifest still more markedly such defective nutrition.

It will be advantageous to review here some of the derangements which are apt to occur in the circulation of the brain.

Congestion or hyperæmia of the brain occurs in two forms, active and passive. The first is accompanied by an increased arterial supply; the second by venous stasis. These may exist in all possible degrees and in very varying extent, and the congestion may be slight and partial, or severe and general.

Active hyperæmia may occur in the form of a slight and transient congestion of a very limited portion of the cerebral tissue, or as a more pronounced general congestion, which is the first stage of inflammation. It is only to the slighter cases that reference will be made. It is influenced by sex and age. Men are more liable to cerebral congestion than women and children, their mental and bodily activity rendering them so; though women with finely-developed and sensitive nervous systems are frequently the victims of irritable cerebral cells, which give rise to hyperæmia. Children suffer from it occasionally in consequence of digestive disorders, and also during the process of teething.

It is most frequently seen in persons of sanguine temperament, who have a tendency to vascular derangements; in the plethoric, with their florid countenances, short necks, and tendency to obesity; and in those who have a well-marked gouty diathesis.

Mosso found, in his experiments, that all mental exertion and emotional excitement were accompanied, in health, by functional hyperæmia of the brain. This is quite in accordance with the law that the blood-supply of an organ varies with the work it has to do.

It occurs as the result of all diseases which increase the force and frequency of the heart's action, and which raise the vascular tension unduly; it is present also in some diseases of the blood-vessels; chronic alcoholism; the morphine habit; organic diseases of the brain; and in some functional derangements of the lungs, liver, and gastro-intestinal canal, etc., etc.

Passive hyperæmia exists, like the active form, in all degrees of severity. It is due to accumulation of blood in the veins and sinuses of the brain, a condition which frequently gives rise to coma. The blood, impeded in its return to the heart, not only becomes a disturbing element, by hindering the capillary circulation, but, venous blood being unsuitable for the purposes of nutrition, the nervous textures are starved, and so rendered feeble and irritable. The causes of passive congestion of the brain are chiefly those which act by obstructing the free return of blood from the head, such as valvular lesions of the heart, especially if the right ventricle is dilated and the lungs and other organs are engorged; aneurisms or tumors pressing upon the veins of the neck; severe coughing, particularly whooping cough; bronchitis and emphysema of the lungs; croup and laryngeal diphtheria.

Anæmia of the brain depends upon a cerebral blood-supply deficient in quantity or quality, or both combined. If the quantity is greatly reduced, the symptoms to which the impoverished blood gives rise are aggravated by the interference with the normal pressure within the skull. Anæmia may be trivial and partial, or severe and general. Among the causes are: Hemorrhage, as in accidents or operations; uterine hemorrhages, post-partum or otherwise; epistaxis; hæmoptysis, hæmatemesis; hemorrhoidal losses. Exhausting diseases, especially those accompanied by profuse discharges, as in deep-seated suppuration, excessive diarrhœa, and leucorrhœa; continued fevers; septicæmia; malarious and cachectic conditions, and wasting complaints; severe inflammatory diseases. Affections interfering with the calibre of the cerebral arteries, such as Bright's disease; syphilis, aneurism, or tumor obstructing the lumen of the vessels, and complicated sometimes by passive congestion; embolic and thrombotic obstructions. "Shock," caused, for example, by fright; the too sudden emptying of the pregnant uterus when there has been an excessive accumulation of liquor amnii; the sudden evacuation of a large

ovarian cyst or of a collection of ascitic fluid; the too rapid emptying of an over-distended bladder in certain enfeebled states of the system. Heart disease, when the quantity of blood sent to the brain is inadequate in amount, as in some kinds of aortic and mitral disease and in fatty degeneration. Poisonous agents in the system.

We must now inquire into several subservient agencies which exert a very decided influence upon the circulation of the brain and, consequently, upon sleep.

Vascular Tension.—This was alluded to in enumerating the causes of cerebral hyperæmia. Its modifications, either in the way of increased or diminished blood-pressure, are so invariably associated with insomnia, that a few words must be said regarding the conditions under which these occur.

The blood-pressure is increased when the calibre of the arterioles is narrowed, and that whether it is due to spasm or to organic changes in the walls of the vessels themselves. In the former case, it may depend upon stimulation of the vaso-motor centre, as in great emotional excitement, hysteria, angina pectoris, or in the chills which mark the onset of acute diseases and the cold stage of the intermittents. It may likewise result from the presence of some noxious agent in the blood, such as lead, ergot of rye, etc., or the materies morbi of gout. It occurs also, in all cases, where the heart beats with unusual force and rapidity, as in hypertrophy, particularly if it is associated with mental excitement; in pregnancy, in obstructive diseases of the lungs, such as bronchitis, and in constipation of the bowels.

Increased arterial tension is indicated by such signs as hard and incompressible arteries; accentuation of the second sound of the heart best heard in the aortic area, and prolongation of the first sound most marked in the mitral area; and by symptoms, such as sleeplessness, increased micturition, etc.

Decreased arterial tension depends upon the reverse conditions. It occurs when the arterioles are dilated, as in all paralyzing influences acting on the vaso-motor centres, such as distressing emotions; in weak and enfeebled states of the system, as in anæmia or phthisis pulmonalis and cachexiæ; in the course of most of the continued fevers; and very markedly in those diseases in which the strength is drained by exhausting discharges, *e.g.*, menorrhagia, etc. A weak heart beating

slowly and feebly is constantly associated with low tension. It may be remembered, however, that a certain amount of relaxation of the blood-pressure is one of the essential factors in producing good sleep. The signs of decreased vascular tension are soft and compressible arteries; enfeebled cardiac sounds, the first being occasionally inaudible, etc.

Cardiac and Vaso-motor Centres in the Medulla Oblongata.

Cardiac Centres.—This very important region contains certain nerve centres governing the heart, by means of which its action is inhibited or accelerated, these being in the most intimate relation with the whole nervous system. Pleasurable emotions, for example, by acting upon them, cause the heart to beat more vigorously; while sudden fright may, through their agency, arrest its action. Impressions of which we are unconscious, transmitted through the vagus from the gastro-intestinal canal, may be sufficiently strong to cause inhibition of the cardiac action and intermission of the pulse. Similar sensations may be conveyed by nerves from every part of the body, so that the closest and most sensitive connections are established between the whole organism and the heart. Everything which tends to enfeeble the body necessarily leads to disorderly movements of the heart, which are shown by its halting, irregular, and excited pulsations.

Vaso-motor Centres.—These are probably in close proximity to the cardiac centres in the medulla (they are so located in the rabbit). By means of the nerves with which they are in connection, they so act upon the muscular walls of the arteries, throughout the entire body, as to cause dilatation and contraction, with a corresponding increase and decrease in the amount of blood that they contain. These vaso-motor centres in the medulla, which are the dominating centres, and probably made up of constricting and dilating mechanisms, are supplemented by many minor centres situated in as many different parts of the gray matter of the spinal cord. Landois and Stirling state that "From the vaso-motor centre fibres proceed directly through some of the cranial nerves to their area of distribution; through the trigeminus partly to the interior of the eye, through the lingual and hypoglossal to the

tongue, through the vagus to a limited extent to the lungs, and to the intestines." . . . "All the other vaso-motor nerves descend in the lateral columns of the spinal cord." . . . "In their course through the cord, these fibres form connections with the subordinate vaso-motor centres in the gray matter of the cord, and then leave the cord either directly through the anterior roots of the spinal nerves to their areas of distribution, or pass through the rami communicantes into the sympathetic, and from them reach the blood-vessels to which they are distributed." It follows that the vaso-motor centres are in the most delicate and intimate relation with the sensori-motor nerves, as well as with the sympathetic ganglionic system, and are so sensitive that they are readily affected by alterations in the quantity and quality of their blood-supply. The vaso-motor nerves are probably of two kinds. One variety has the function, when stimulated, of causing contraction of the vessels and increased blood-pressure—the vaso-constrictors; the other has the power, when stimulated, of producing dilatation of the vessels and diminished blood-pressure—the vaso-dilators.

The centres which control these dilators probably act through reflex impressions. When the vaso-constrictors are inhibited, the arterial vessels dilate and the blood-pressure is lowered. In health, the vaso-motor centres, higher and lower, with their nerves, co-ordinate, in order to preserve in all the arteries of the body a certain amount of contraction, known as "arterial tone." Interference with this tonicity may be confined to limited areas or it may become general, according to the nature of the disturbing influence; but whether local or general, the medullary centres dominate the whole.

These cardiac and vaso-motor centres are intimately associated in the medulla oblongata with many other centres of the greatest importance, such as those of respiration, mastication, deglutition, secretion of saliva, vomiting, sneezing, and those for the sweat glands, as well as others of less importance. If to this be added the fact that all the cranial nerves except the first four have their origin in the medulla, and that all sensory and motor impulses to and from the brain pass through it, it will be apparent that the cardiac and vaso-motor centres are in the very closest proximity to centres and channels which control and communicate with every part of the

body, and that they must be influenced by impressions conveyed to them by contiguity as well as by continuity. Vomiting, for instance, is of frequent occurrence after prolonged fits of coughing, and it can only be satisfactorily explained upon the theory that the excitement in the centre for cough spreads to that for vomiting. Sweating, likewise, is caused by stimulation of other centres in the vicinity of its particular centre; *e.g.*, many persons whose sleep is disturbed are prone to wake bathed in cold perspiration. In further illustration of the fact that excitement spreads from one centre to another, it may be mentioned that the writer has twice lately witnessed most profuse sweating, in a case where the exciting cause was a dyspeptic attack of nervous origin, in which vomiting and oppression of breathing were marked symptoms.

Cough, depending upon distant excitations, such as spinal irritation, arises in a similar manner. If investigators are able in the future to demonstrate the existence of centres for gout and other constitutional diseases, which are at present supposed to exist in the medulla oblongata, in close proximity to the vaso-motor centres, it will be easy to understand why sleeplessness is so apt to supervene in these affections.

That mental impressions affect the vaso-motor and cardiac centres, we have ample evidence in the pallor induced by fear; while we know that stimulation of any of the sensory nerves leads at once to modification of blood-pressure, particularly in that of the brain. It has been suggested that this is the mechanism by which the safety of sleepers is secured. Alterations in the quality of the blood lead to changes in the cardiac and vaso-motor centres, their irritability being increased, with consequent contraction of the arteries, when the blood is deficient in oxygen.

The sympathetic or ganglionic nervous system exercises an important influence upon sleeplessness. Dominating as it does the nutritive processes, and acting as a direct channel of communication between the viscera and the brain, it conveys impressions arising out of deranged functions, which often lead to insomnia.

It does not seem advisable to pursue this interesting question a greater length, sufficient data having been advanced to indicate its bearing upon the subject under consideration.

The diseases enumerated as causes of active and passive

congestion and anæmia of the brain, as well as the conditions giving rise to alterations in the vascular tension, etc., will, if carefully scanned, be seen to correspond, with wonderful exactness, to a list of the diseases which give rise to insomnia. It is not for a moment alleged that the list is by any means complete, or that insomnia depends solely upon these vascular derangements, brought about, in some cases, by the influence of the brain and nervous system; but these preliminary considerations go some way in the direction of a rational explanation of the causation of insomnia, upon which we may reasonably hope to found a broad and enlarged conception of the subject, as we go on to consider in detail some of the numerous diseases of which it is a symptom.

Adequate Repose.—In the preceding chapter we saw that repose was necessary for restoration of the equilibrium in the nervous system—for the removal of the products of waste, and the renewal of nervous energy.

The loss of a single night's sleep shows its effects on the nervous system in the exhaustion, drowsiness, irritability, febrile disturbance, and digestive derangements which ensue. The tone of the whole body is lowered to such a degree, as every medical man knows by experience, that it invariably requires more than one good night's sleep, to restore the individual to his accustomed mental and physical state, justifying the old saying that "one good night's sleep requires another."

When sleep is voluntarily limited for any length of time, the consequences are perceived in a still more marked degree, and may be well studied by examiners in medicine in the persons of young and healthy candidates, who, in the course of preparation for examination, have made continued inroads upon their usual allowance of sleep. In cases such as these, the system becomes exhausted, and they look worn and wan, feel jaded, depressed, irritable, and disinclined for exertion. All the organs suffer from enervation, the heart becomes irritable, palpitates, and beats intermittingly; digestion is languidly and imperfectly performed; and if the pernicious practice has been carried beyond certain limits, disturbances of nutrition may be initiated which are the starting-point of serious organic changes.

These effects may likewise be noticed in the poor, who are

obliged to continue their work into the night to eke out their means of subsistence, as well as in searchers after pleasure who convert night into day. The results in the former case being complicated by symptoms of further privations, and in both by the breathing of heated and contaminated air. These consequences appear more easily and quickly in those whose nervous systems are sensitive, and they tend to develop into diseases, to which such persons may have an hereditary predisposition. A time at last arrives when sleep can no longer be obtained, and sleeplessness becomes the bane of existence. This symptom being superadded to the already enfeebled condition, leads to neurasthenia, or to diseases more grave, even in some cases to insanity and suicide.

In animals, the untoward effects of want of sleep are so generally recognized by those who keep them for gain or work, that the utmost care is taken to secure for them a sufficiency of undisturbed sleep.

Rightly-adjusted Work.—As in a subsequent chapter we must discuss this subject very fully, we need simply premise here that a function can only be satisfactorily discharged, when the work imposed upon the structures is regulated in accordance with their strength. It is equally necessary that the tissues should be exercised. A brain which is properly used is adequately nourished and, consequently, vigorous. Its functions (such as sleep) are healthily performed. An excess of work leads to hyperæmia, and a deficiency to anæmia, of the brain. Both of these conditions are unfavorable for good sleep.

Conditions Which Influence Sleep and Sleeplessness.

It will be convenient to study the questions of sex, age, temperament, habit of sleep, occupation, method of living, history, season, and climate, in their relation to sleep and sleeplessness, the amount of sleep that the individual requires being, to a great extent, influenced by these factors.

Sex.—Men require less sleep than women, and in this connection it should be remembered that a man's pulse beats on an average five times less per minute than a woman's. As a rule, the female possesses more nervous excitability, and being more impressionable than the male, she requires more sleep for the restoration of her energies; and this is equally

true of the weakly and of convalescents, in whom nutrition is slowly performed. Women, however, bear the loss of sleep better, for a time, than men. The length of time they can devote themselves to night-nursing in response to the calls of affection or duty has scarcely any limit. On account of the impressionable and unstable character of the nervous system, women bear the strain of life less buoyantly than men, and so are more liable to insomnia. Girls more frequently than boys suffer from overwork at school. Woman's work in every-day life is usually more monotonous than that of man; she is less in the open air, and frequently takes less exercise; and these causes combined are not conducive to good sleep. Men, on the other hand, have to bear the brunt of the battle of life; this in many instances necessitates great mental activity and anxiety, which are prone to cause sleeplessness.

Age.—A large portion of an infant's life is spent in sleep. The enormous expenditure of energy connected with the evolution of the brain and body generally, demands a relatively greater amount of sleep than is necessary when comparative maturity has been reached. Sleep is often disturbed at this tender age by improper sleeping arrangements, as when the child's feet are cold, or the temperature of the apartment is too high.

The need for sleep decreases as the growth of the body approaches completion. During the years from ten to twenty, from nine to ten hours' sleep are required, especially on the approach of puberty.

In middle age, when the waste and repair of the tissues alone require adjustment, eight hours' sleep is abundant.

In advanced years, the bodily temperature is modified, the heart beats more slowly, the cerebral arteries undergo degenerative changes, brain and body deteriorate, and nutrition is slowly and imperfectly accomplished. Under these circumstances a longer period of sleep is indispensable.

The late Mr. Hilton, in his lectures on "Rest and Pain," wrote: "The interruption of rest by local disease, occurring to persons in the middle period of life, does not cause the same degree of exhaustion and wasting as in the young. They bear the loss of sleep better, because their constitution has to sustain the stress of repair only, not of both development and repair, as in the child. Their recovery is slower; their subse-

quent sleep is not so profound nor so prolonged, nor their rest so complete. The defective sleep and slow repair which manifest themselves in the old after injury of any kind are familiar to us all."

Notwithstanding the general indications given above, it must be admitted that no hard-and-fast rule can be laid down as to how many hours an individual ought to sleep. For all practical purposes the rule holds good, that a child or adult should sleep until he is recruited, awaking in the morning full of vigor and with a marked sense of well-being. Restoration should be the crucial test. It is a far more reliable guide than any empirical statement as to the time to be spent in sleep; for it follows, if it is wanting, that the energies have not been sufficiently renovated. Sleep requires to be of certain duration and quality to complete the repair of the exhausted tissues by the removal of the excrementitious products and by the assimilation of the pabulum necessary for the accumulation of the store of potential energy.

No two persons are similarly constituted, and if they were, the demands they make upon their strength are utterly unlike. One class of men expend their energies with some degree of regularity; while another class make extraordinary calls upon their vigor on occasions of special urgency. This latter class is illustrated by the merchant in deciding gigantic transactions; by the barrister in important trials; and by the surgeon in deciding upon and performing difficult and dangerous operations, etc. In the intervals, no such expenditure of energy is needed, work being of an ordinary and less eventful kind. Again, the demands made upon the digestive system (not to refer to the muscular system) vary in a similar manner, and these, implying unequal degrees of waste, require diverse quantities and qualities of recuperation.

The benefits arising from sleep cannot possibly be estimated by its duration alone; its quality is an equally important factor. There are many kinds of sleep. Without referring to restless and dream-laden sleep, it is a matter of common knowledge that a short sound sleep often recuperates a man better than a long sleep, and this is specially the case in particular climates. Many bad sleepers find themselves much more jaded and exhausted after an unusually long and very deep sleep than after one shorter and less sound. Such per-

sons not infrequently awake after their lethargic slumbers bathed in perspiration and in much mental distress.

The fickleness (if the expression may be permitted) of sleep is well exemplified by an occurrence which almost every one must have experienced—that the invigoration they felt on awaking in the morning after six hours' sleep was completely dispelled by a second sleep of one or two hours' duration. It is equally well known that a siesta of a few minutes' duration is often followed by a sense of invigoration, while one lasting an hour or two is followed by weariness and depression. In this latter case digestive derangements may of course account for some of the depression.

Temperament.—In people of sanguine temperament the heart is, as a rule, large and powerful, the circulation active, and the bodily functions easily and quickly performed; so that in health such persons usually sleep well and soundly, and rise in the morning refreshed and vigorous. About middle life they become subject to circulatory derangements, which not infrequently lead to disturbed sleep. Many in this class are gouty, and consequently have a predisposition to insomnia, depending on an altered state of the blood from imperfect metabolism. Such persons bear any abridgment of sleep badly, and they very speedily evince signs of this in general enfeeblement. They suffer more quickly and severely from loss of sleep than almost any other class.

The neurotic temperament includes a class whose brain and nervous systems dominate tyrannically over the other systems of the body. In health, sleep is of comparatively short duration. Neurotics are indefatigable workers, prone to fatigue their nervous systems, and this, combined with an hereditary tendency to nervous diseases, conduces to bring about conditions which cause insomnia. In youth, a neurotic often breaks down and becomes sleepless from mental and physical over-fatigue. In middle age, when defective innervation originates faulty digestion, which results in impaired nutrition of the brain and nervous system, sleeplessness is seldom absent.

The lymphatic temperament embraces a group who sleep well if not soundly, their functions being languidly performed. They have no tendency to those circulatory or neurotic ailments which are pregnant sources of insomnia.

There are many combinations of these temperaments, and it is of some importance to trace out the predominating one, as in many cases it affords a clue to the origin as well as to the treatment of persistent wakefulness.

Habit of Sleep.—Some people have the faculty of sleeping at will, and certainly the power may be cultivated, as it is said to have been by the great Napoleon, M. Thiers, and by the first Duke of Wellington.

Others, again, have accustomed themselves to a very limited amount of sleep, and are able to work actively and steadily for lengthened periods of time without suffering any apparent inconvenience, while sleeping only for four or five hours out of twenty-four. As a rule, however, this practice is inadvisable, for though all duties may be capable of easy performance, there is a liability, in such persons, to the onset of certain disorders, and probably, in the long run, to the abridgment of life. John Wesley, who appears to have acquired an excellent habit of sleep, believed that a man could determine how much sleep he actually needed simply by rising half an hour earlier every morning until he fell asleep the moment he got into bed at night, and did not wake until it was time to rise. Such an opinion must be accepted conditionally; the question cannot be so concisely disposed of. It is recorded that the late Duke of Wellington (who had a famous sleep habit) said to some one who remarked that his bed was so narrow that there was no room in it to turn, that "when a man began to turn it was time to get up." This was the speech of a man in full health and with a remarkable faculty for sleep. Although it has often served as the text of a lecture on the subject of early-rising, it has no general application. Such lectures delivered, as they commonly are, to the indolent and slothful, may do no harm; to poor sleepers they are nothing less than travesties, for if these rose every time they turned, they might as well never go to bed.

Charles Lamb, in his famous "Essays of Elia," discusses several popular fallacies, among others, "That we should rise with the lark," and in doing so states the other side of this question. "Not but there are pretty sun-risings, as we are told, and such like gawds, abroad in the world, in summertime especially, some hours before what we have assigned; which a gentleman may see, as they say, only for getting up.

But having been tempted once or twice, in earlier life, to assist at those ceremonies, we confess our curiosity abated. We are no longer ambitious of being the sun's courtiers, to attend at his morning levées. We hold the good hours of the dawn too sacred to waste them upon such observances, which have in them, besides, something Pagan and Persic. To say truth, we never anticipated our usual hour, or got up with the sun (as 'tis called) to go a journey, or upon a foolish whole day's pleasuring, but we suffered for it all the long hours after in listlessness and headaches; Nature herself sufficiently declaring her sense of our presumption in aspiring to regulate our frail waking courses by the measure of that celestial and sleepless traveller."

The benefits accruing from a capacity to fall asleep quickly and to slumber soundly until the hour for rising cannot be overstated. Such a capacity constitutes a good habit of sleep. On the contrary, the practice of curtailing sleep by sitting up late into the night, or by rising at too early an hour in the morning, is anything but a desirable one.

Occupation.—The more highly-cultured races sleep for a shorter time than those in the lower grades of civilization. Active brain-workers require, and probably get, a smaller amount of sleep than those who are engaged in manual labor, and still less than those who spend their days in frivolity and idleness. They live their lives more fully. Some of the most acute and brilliant thinkers and writers of the present day sleep comparatively little, from the power, probably, that they possess of concentrating their sleep (illustrating the quality of sleep). Brain-workers are peculiarly liable to sleeplessness. The cerebral cells, being in constant use, are apt to remain active after work has been abandoned, and while this is the case, sleep is prevented. Those who work with their bodies sleep more than brain-workers, for two reasons: first, on account of the resulting physical fatigue; and second, because their brains being seldom called into activity, hyperæmic conditions which, in the other case, act as causes of insomnia, are absent. Their sleep is heavy and more lethargic than in the case of brain-workers. If, however, the work is carried on in close workshops and in constrained positions, the dyspeptic troubles which are liable to follow may induce wakefulness. Dr. Lauder Brunton, in his Croonian Lectures this year, re-

ferring to the fabrication of lactic acid during physical exertion, as observed by Preyer (page 519), writes: "If much of it be formed in consequence of violent or prolonged exertion, it will pass into the circulation and tend to lessen the alkalinity of the brain as well as other tissues, and sleep might therefore be induced by a long walk, where acid is formed in the limbs, as well as by prolonged mental work, where the acid is a product of the brain itself." This statement makes reference to mental and physical exercises within physiological limits, for no fact is more generally recognized than that mental and bodily over-fatigue are not conducive to good sleep. A certain amount of muscular activity is almost an absolute necessity for sound sleep. (Exercise is the antithesis of repose, and the study of every function indicates the need for work alternating with rest for its healthy performance.)

It may be that a limited amount of lactic acid, such as is manufactured by an adequate measure of intellectual and corporeal work, promotes sleep; while an excessive formation of acid, the result of exhaustive labor, hinders sleep. Such an explanation would account for the disturbed sleep in acute rheumatism, a disease in which an acid, probably lactic, is supposed to exist in excess in the blood. Moreover, it would explain why gouty persons (whose blood contains an exceptionally large quantity of uric acid) are so much troubled with insomnia.

Much was written at one time concerning the effects of railway travelling in preventing sleep, but the writer, after careful inquiries, which, as medical adviser to two railway companies, he had extensive opportunities for making, was unable to find any evidence in support of this opinion.

Method of Living.—Large and generous feeders sleep more than small and careful eaters, the continued congestion of the digestive organs depleting the brain and favoring sleep, provided no dyspeptic troubles arise. This tendency to sleep after meals is worthy of consideration in connection with the hypothesis just stated, that a certain increase of acid in the blood tends to promote sleep. It is well known that the ingestion of food increases the alkalinity of the blood. Sir William Roberts believes that a meal "is *pro tanto* a dose of alkali, and must necessarily, for a time, add to the alkalescence of the blood." If acid was an essential requisite for sleep, it would

almost necessarily follow that food would cause wakefulness. Such is not the case. The belief that has long prevailed, which ascribes drowsiness after meals to congestion of the stomach and a concurrent modified anæmia of the brain appears to be well grounded.

Those persons whose extremities grow cold after eating, the kind of people that are usually subject to chilblains, are frequently poor sleepers. Those who consume alcohol in any quantity sleep longer and more heavily than those who abstain altogether. Any excess requires to be slept off. Both large eaters and large drinkers are prone to sleep disturbance. Privation leads to debilitated conditions which are inimical to sleep. Residence in unhealthy places, in close offices, and badly-ventilated rooms; deficient exercise; excesses of all kinds; the inordinate use of tea, tobacco, etc., are all sources of sleeplessness.

History.—This embraces hereditary tendencies to nervous diseases, such as insanity, hysteria, etc.; to gout, rheumatism, etc.; to heart disease, etc., which are all predisposing causes of insomnia. Evidence of these must be searched for in the collateral branches, as well as in the direct line of descent. It is occasionally useful, when consulted by a sleepless married person of middle age, to inquire carefully into the health of their progeny, for a history of somnambulism or incontinence of urine occurring in a child may throw a good deal of light on the case; past history, as previous residence in unhealthy or malarious districts; illnesses, such as hemorrhages, inflammations, fevers, sunstroke, syphilis, dyspepsia, etc.; former habits—for example, excesses, mental or physical strain, etc.; present condition—the existence of obstructed nostrils, enlarged tonsils, elongated uvula, and like abnormalities. These and similar influences are provocative of sleep disturbance. Persons who have dry and harsh skins (skins that do not perspire easily) are often bad sleepers.

Season.—Less sleep is demanded in summer than in winter. This has been attributed to the fact that the maintenance of animal heat calls forth a larger consumption of energy during cold weather, requiring, in consequence, an increased amount of sleep to adjust the equilibrium between waste and repair.

Climate.—For a like reason, those who reside in cold re-

gions require more sleep than the inhabitants of warmer climates, the temperate zone being more conducive to good sleep than those localities exposed either to the extremes of heat or of cold. Cold, by contracting the peripheral vessels of the body, causes cerebral congestion, which is incompatible with sleep. If the cold is very intense, sleep may supervene, but it is probable in this case that the sleep is associated with slight coma, as it soon deepens into that condition, and is followed by death. If the body is exposed to cold during sleep, when the bodily functions are being languidly performed, it is cooled with greater rapidity than if it were exposed to the same degree of cold during the waking state, and consequently a fatal termination is more to be apprehended.

Sleep is rendered difficult or impossible, also, when the temperature of the atmosphere is high, as in tropical climates; and in India this difficulty is so generally recognized, that provisions are made in every-day life to insure sleep by means of artificial devices, those who can afford the luxury securing a supply of cool air to their bedrooms by means of a punkah-wallah, which is worked by a servant outside the house. Sir Joseph Fayrer writes: "Near almost every village there are one or more small channels, by which water from the neighboring spring is conducted to the cultivated lots of ground for the purpose of irrigation, and these channels are, in parts, formed of troughs hollowed out of trees. A piece of bark or matting is laid on the lower of these troughs, and on this the infant, swathed in a large mass of clothes, is so placed that the water from the upper trough falls on the vertex of the cranium, and glancing off runs away under the bark or matting, without further wetting the child or its clothes; or if the stream is full and copious, the child is placed on the side of the channel, and a portion of the stream directed on its head by a large leaf or piece of bark, another leaf or piece of bark being arranged on the other side of the head, so as to catch the water and carry it away. Children so placed will lie asleep for hours, and the mothers leave them while they go about their daily occupations.

Excessive heat has a marked effect in producing weak action of the heart, which is apt to be followed by insolation. For centuries it has been noted that unusual dryness of the atmosphere, such as is found on the shores of the Mediterra-

nean, is a frequent cause of sleeplessness, especially in excitable persons, whose sleep, at the best of times, is not satisfactory. It is important to bear this in mind when recommending change of air for such individuals. Various devices have been proposed to obviate this, such as hanging up wet sheets, watering the carpets, or exposing vessels of water in the room to supply the deficiency by evaporation.

One constantly hears complaints of inability to sleep during temporary residence at seaside resorts, and the cause of this is not difficult to explain. The invigorating air acts as a powerful tonic to the heart and blood-vessels, raising the blood-pressure considerably, as is evidenced by the large increase in the amount of urine secreted; and thus, for a time at all events, disturbing the balance of the circulation so as to interfere with sleep.

Moderate altitudes are more conducive to good sleep than the sea level or high altitudes.

Many persons in health have their sleep improved by a visit to the seaside, and they usually, though not invariably, sleep well there when they are ill; others, again, are rendered wakeful, and this is generally aggravated during illness.

In the belief that it may serve some good purpose to indicate the causes of insomnia as they present themselves to the physician in private practice, the writer subjoins a list of one hundred and sixty-seven consecutive cases. His previous notes are of selected cases alone. From the category are excluded all cases depending upon pain, inflammatory and febrile affections, cough, as well as the more trivial cases, caused by drinking tea or coffee after dinner, in which the insomnia disappeared when these beverages were discarded.

	Cases.	Ages. Males.	Females.
Neurasthenia,	19	48, 47, 44, 40, 40, 30, 24, 19.	45, 40, 34, 32, 30, 30, 29, 28, 25, 25, 23.
Chronic gout,	19	74, 70, 61, 60, 56, 50, 50, 44.	84, 70, 65, 63, 60, 60, 60, 59, 50, 45, 40.
Overwork,	17	46, 45, 43, 42, 40, 40, 30, 28, 18.	18, 13, 13, 11, 11, 10, 10, 10.
Worry,	17	45, 45, 45, 44, 40.	66, 53, 46, 45, 45, 44, 44, 37, 36, 36, 30, 22.
Alcoholism,	10	55, 50, 50, 45, 36, 30.	60, 50, 49, 44.
Dyspepsia (not gouty),	10	64, 40, 37, 34.	50, 46, 45, 34, 29, 26,
Menopause,	8		50, 49, 48, 46, 46, 46. 45, 44.
Senility,	8	81, 77.	84, 81, 80, 76, 72, 63.
Chronic heart-disease,	6	61, 58.	76, 68, 65, 30.

	Cases.	Ages. Males.	Females.
Incipient Insanity,	5	70, 18.	65, 63, 40.
Night terrors,	5	7, 4, 3.	5, 3.
Eczema,	5	68, 60, 54.	45, 18.
Rickets,	4	5, 3.	4, 2.
Shock,	3	80, 50.	64.
Exophthalmic goitre,	3		42, 40, 24.
Somnambulism,	3	30, 15.	28.
Hypochondriasis,	3	45, 30.	44.
Paralysis agitans,	2	60, 54	
Migraine,	2		42, 31.
Hysteria,	2		35, 20.
Constipation,	2	34, 26.	
Syphilis (acquired),	2	45.	35.
Syphilis (inherited),	1		3 months.
Epilepsy,	1	18.	
Locomotor ataxy,	1	50.	
Enlarged prostate,	1	85.	
After parturition,	1		23.
Noises,	1		70.
Post-choreal,	1	14.	
Anæmia,	1		30.
Morphine habit,	1	46.	
Chloral and cocaine habit,	1		37.
Tapeworm,	1		34.
Threadworms,	1	50.	
Total,	107	71	96

Dr. Guthrie Rankin, who practises in the county town of Warwick, has kindly given the writer his notes of the last sixty-three consecutive cases of insomnia—similar to the above—that he has had under his care. They are as follows:

	Cases.	Ages. Males.	Females.
Neurasthenia,	9	46.	54, 39, 39, 38, 32, 32, 32, 28.
Menopause,	8		50, 50, 49, 49, 47, 46, 46, 40.
Chronic gout,	7	53, 38, 32, 32, 32, 26.	54.
Worry,	6	54, 39.	69, 63, 56, 34.
Overwork,	5	33, 27, 17.	24, 22.
Dyspepsia (not gouty),	4	54, 47.	40, 30.
Post-dysenteric,	3	41, 28, 28.	
Shock,	3	76, 63.	32.
Alcoholism,	3	45, 34, 31.	
Anæmia,	3		47, 38, 37.
Senility,	2	84.	74.
Chronic heart disease,	2	58.	39.
Threatened insanity,	1		37.
Hyperosmia,	1	43.	
Melancholia,	1		56.
Post-choreal,	1		18.
Since childbirth,	1		30.
Somnambulism,	1		18.
Since sunstroke,	1	28.	
Chronic bone disease,	1		52.
Total,	63	26	37.

Dr. Malcolm Mackintosh, who practises in the populous district of Clapham, has also been good enough to furnish the writer with notes of the last forty-three consecutive cases which he has had under treatment.

		Ages. Males.	Females.
Worry,	13	50, 44, 23.	50, 50, 47, 46, 45, 44. 39, 38,34, 33.
Neurasthenia,	9		53, 51, 48, 48, 46, 42, 39, 37, 31.
Chronic bronchitis,	4	72, 71, 43.	56.
Alcoholism,	3		60, 50 32.
Dyspepsia,	3		56, 48, 36.
Chronic phthisis,	2		48, 42.
Menopause,	2		49, 46.
Senility,	2		82, 72.
Chronic rheumatism,	2	53, 48.	
Disease of stomach,	1		41.
Epilepsy,	1		42.
Chronic uterine disease,	1		32.
Total,	43	8	35

Although no definite or reliable conclusions can be deduced from such scanty premises, these statistics are nevertheless valuable, as indicating, in some measure, the causes of functional (?) insomnia, and the ages at which these most frequently operate. Being consecutive cases, and occurring in different parts of the country and in varying classes of society, they show the influence of like agencies, and that these act with tolerable uniformity.

They justify the opinion which the writer has long held, that quite a half of all of the cases that are popularly known as functional insomnia are due to an inherent instability in the cerebral textures which renders them vulnerable, and liable to be impressed unfavorably by circumstances incident to various stages of life; in short, prone to break down under the strain of the wear and tear of every-day life.

In the writer's own cases such defective structures may be said to have caused the following. Neurasthenia 19, overwork 17, worry 17, menopause 8, night terrors 5, shock 3, hypochondriasis 3, somnambulism 3, hysteria 2, epilepsy 1, incipient insanity 5, post-choreal 1, after parturition 1, migraine 2; in all, 87 cases, or 52.095 per cent.

The other cases are as follows:

Gout, or defective metabolism,	19 cases, or	11.372	per cent.
Toxic, alcohol, etc.,	15 "	8.982	"
Alimentary system,	14 "	8.383	"

Circulatory system, ...	10	cases, or	5.987	per cent.
Senility, ...	8	"	4.790	"
Cutaneous, ...	5	"	2.994	"
Rickets, ...	4	"	2.335	"
Paralysis agitans and locomotor ataxy, ...	3	"	1.796	"
Enlarged prostate, ...	1	"	.598	"
Noises, ...	1	"	.598	"
Total, ...	167	"	99.930	"

The combined statistics of two hundred and seventy-three cases of insomnia were caused mainly by—

(1) Neurasthenia, .	37	cases, or	13.55	per cent.
(2) Worry, . .	35	"	13.18	"
(3) Gout, . . .	26	"	9.52	"
(4) Overwork, . .	23	"	8.04	"
(5) Menopause, . .	18	"	6.59	"
(6) Dyspepsia, . .	17	"	6.22	"
(7) Alcoholism, .	16	"	5.86	"
(8) Senility, . .	12	"	4.39	"

In short, these eight causes account for 184 cases, or 67.36 per cent of the whole number. They will, consequently, form the chief subjects for discussion in the following pages.

These statistics, moreover, when considered in connection with previous experience, go some way in the direction of constituting a basis upon which the sources of insomnia may be generally, if roughly, summarized as follows:

In the tender age of infancy, digestive derangements (which often arise from injudicious feeding); dentition; hereditary taint, as syphilis, and rickets, act prejudicially; and infantile convulsions, night terrors, laryngismus stridulus, spasmodic croup, etc., are the result.

In childhood, while yet the emotional centres predominate in activity, impressions such as fright, fear, etc., cause chorea; and these, as well as digestive derangements and the strain of educational competition, lead to impaired sleep. At this period, sleep is apt to be unequal in distribution and depth, a condition which initiates somnambulism, incontinence of urine, and similar disorders.

At puberty, when the evolution disturbs the equilibrium

of the nervous system in girls, hysteria, epilepsy, and like ailments may be induced, and result in insomnia. At this age, boys and girls may suffer from the effects of overwork.

TABLE INDICATING THE AGES AT WHICH INSOMNIA OCCURS.

	Dr. Macfarlane's			Dr. Rankin's.			Dr. Mackintosh's			Totals.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1—10 years	5	5	10	..	..	..	..	..	..	5	5	10
10—20 "	6	9	15	1	2	3	..	.	..	7	11	18
20—30 "	3	12	15	3	5	8	1	..	1	7	17	24
30—40 "	9	17	26	9	13	22	..	10	10	18	40	58
40—50 "	22	26	48	6	10	16	3	15	18	31	51	82
50—60 "	12	5	17	4	4	8	2	7	9	18	16	34
60—70 "	7	13	20	1	2	3	..	1	1	8	16	24
70—80 "	4	5	9	1	1	2	2	1	3	7	7	14
80—90 "	3	4	7	1	..	1	..	1	1	4	5	9
Total	71	96	167	26	37	63	8	35	43	105	168	273

In adult life, sleeplessness is apt to appear at an earlier age in women than in men. This arises, in the married, from disturbance of the uterine functions, pregnancies, hemorrhages, and over-lactation. In the childless, from causes connected with their sterility. In the unmarried, from disappointments, etc. In all these cases, the indiscreet use of tea and, in rarer instances, of alcohol, may act deleteriously; while many such persons tend to become neurasthenic.

In middle age there are three great sources of sleeplessness in men: neurasthenia; metabolic and digestive derangements; poisons, as tea, tobacco, and alcohol. In women the sources are chiefly threefold: neurasthenia, the menopause, lithiasis.

In later life, when the trials of existence begin to press heavily and to be borne less buoyantly, worry becomes a pregnant source of insomnia.

In advanced years, an altered state of the nutrition of the

brain, and digestive and circulatory troubles, are the chief causes of disturbed sleep.

Diagnosis.—As insomnia depends on causes so numerous, so diverse, and so inconstant, it is impossible to generalize or to formulate a table to convey any clear idea of its source.

Every case requires to be studied carefully upon its own merits, but the main lines upon which the inquiry should be conducted may be briefly indicated. The age, sex, and occupation of the patient should be noted, and the habits, past history, temperament, and hereditary tendencies investigated, especial attention being directed to the habit of sleep. In obscure cases, the condition of the nervous system should be studied in order to determine whether the excitability of the cerebral cells is dependent on inherent exhaustion or on irritability, or is due to impressions transmitted from distant parts of the body. The state of the various reflexes, and the conductivity of the nerves, especially the cranial nerves, should be ascertained. The condition of the digestive organs and liver must be narrowly scrutinized. Careful examination of the vascular system should be made, and the amount of vascular tension determined; and any modification in the quantity or quality of the blood noted, such as anæmia, or plethora, or the presence of the gouty, rheumatic, or syphilitic poisons. The condition of the lungs, kidneys, and other organs must not be overlooked. [If the inquiry could be limited to cases dependent on functional (?) origin, some assistance would be obtained from considering the time at which the sleep disturbance occurs; for the reason that sufferers from insomnia from these causes may be roughly divided into two classes: (1) those who are unable to fall asleep; and (2) those who fall asleep easily, but soon awaken.

(1) Those who are unable to fall asleep when they go to bed. This is usually due to activity in the brain, maintained (*a*) by the effects of overwork, worry, fear, hysteria, or of tea or coffee, etc.; (*b*) in consequence of an increased blood-supply (preventing its quiescence) arising from disturbing agencies in the economy, as cold feet, pruriginous irritations, acute dyspepsia, or feverish states, implying, as these do, the quickening of the circulation to the extent of from eight to ten beats for every degree of increased temperature.

(2) Those who fall asleep easily, but whose slumbers soon

terminate in a vigil. They embrace two sections. (*a*) Those who possess impressionable cerebral cells, as in neurasthenia, hypochondriasis, night terrors, etc. Such cells, being peculiarly sensitive, perceive speedily and acutely trifling disturbances in the system. (*b*) Those whose cerebral cells are rendered irritable by an impure blood-supply, such as accrues from a disordered metabolism, as in hepatic and intestinal dyspepsia; or pertains to gout, rheumatism, and syphilis. It must, however, be remembered that there remain many exceptions to such a classification.]

The various instruments used in diagnosis must be called into requisition, although less assistance is derived from the ophthalmoscope and sphygmograph than one would *à priori* have expected.

It may here be added that dreams are not yet sufficiently understood to be valuable as a means of diagnosis. They prelude insanity, apoplectic and epileptic seizures; the menstrual periods; phthisis pulmonalis, and the continued fevers. They are seldom absent in congestive conditions of the brain and its membranes; in valvular heart disease; aneurism; chronic diseases of the lungs, and in dyspepsias. A dream occurring at rare intervals is usually attributable to indiscretion in eating or drinking. It is worthy of note that many gouty persons, who dream a great deal, affirm that it does not seem to interfere with the restoration of their nervous energy.

Prognosis.—The value of sleep in prognosis. Hippocrates, in discussing prognostics, wrote with regard to sleep: "As is usual with us in health, the patient should wake during the day and sleep during the night. If this rule be anywise altered it is so far worse, but there will be little harm, provided he sleep in the morning for the third part of the day; such sleep as takes place after this time is more unfavorable; but the worst of all is to get no sleep night or day, for it follows from this symptom that the insomnolency is connected with sorrow and pains, or that he is about to become delirious." He likewise gave three aphorisms connected with sleep: "In whatever disease sleep is laborious it is a deadly symptom; but if sleep does good it is not deadly" (he evidently refers to coma). "When sleep puts an end to delirium it is a good symptom; when it increases delirium it is deadly. Both sleep and insomnolency, when immoderate, are bad."

The capacity for sleep is always an important factor in prognosticating the question of recovery from a serious illness, or the advisability of operative interference; it being a rule, to which there are few exceptions, that the better a patient sleeps the greater are his chances of recovery. Sir James Paget wrote in 1867 concerning the various risks of operations: "A better sign is the capacity for sleep. If a patient can always sleep long at a spin, that is a good patient."

Natural sleep, returning and becoming sounder in intensity and longer in duration, in the course of a severe disease, is always an excellent omen, and one to be relied upon, even when the other symptoms appear not to justify it. It is of equally good import in less pronounced affections.

Wakeful and restless nights supervening in the course of a prolonged illness are often, if not always, indicative of an unfavorable change, or of a relapse. Occasionally they derive additional importance from the fact that they precede all other unpropitious symptoms, the cerebral cells apparently perceiving and evincing the effects of alterations in the system before any of the other structures.

In regard to young children, the following remarks of Henoch are worth quoting: "In judging of the condition of new-born infants and children at the breast, I should further recommend you to observe how the hands are held during sleep. Healthy children at this age sleep, as is well known, with their arms flexed to such an extent that the hands are directed right upward and are on a level with the neck or lower jaw. This attitude—which is perhaps a reminiscence of intra-uterine life—is changed in the case of serious illness, and its presence may consequently be regarded as a reassuring sign."

It is found that people who usually sleep well in health often do so also during illness; while those whose sleep is never very sound have their rest more seriously interfered with when they are ill, this being, as already said, a factor which adds considerably to their peril.

Treatment.—It goes without saying that the cure of sleeplessness is sleep. If the definition of insomnia given in the opening sentence of this chapter is accurate, sleep can only be obtained by allaying the vigilance of the cerebral cells. To accomplish this, we must unravel the abnormal condition in

the economy which originates it, so that the exciting cause may be removed and any predisposing cause alleviated, as far as it is possible. In this manner the health and stability of the cerebral cells are re-established and their healthy function, sleep, restored. The method in which this may be best achieved will be treated fully in the following pages. We may here offer a few preliminary remarks on treatment.

First, as regards habit of sleep, to which we have already referred (p. 542), there can be no doubt that sleeplessness is frequently the result of the acquirement of a bad habit, either as regards the regularity and duration of sleep, or the practice of taking with us, into the hours which ought to be devoted to repose, the worries and anxieties of our daily life. These evils stamp themselves upon the nervous system in the same way that over-indulgence in alcoholic stimulants does, and, like the latter, are very difficult to root out. This influence of habit is well exemplified in many aged persons, who in their youth were accustomed to rise at an early hour in the morning, and who in consequence have continued to do so throughout their lives; and also by the loss of sleep which some experience when sleeping in a strange bedroom, although the bed and surroundings are even more comfortable than those to which they are habituated.

The writer has intimate knowledge of a man who now sleeps soundly for eight hours every night, having succeeded, by dint of a determined effort of the will, in overcoming a sleepless habit that for years afflicted him. Every one ought to cultivate the habit of retiring punctually at a certain hour, divesting the mind, as far as it is possible, of care, so as to fall asleep at once, and of rising at the instant of awaking in the morning. Early rising is not for its own sake to be advised, unless the hour of retiring to rest is correspondingly early.

The conditions of sleep as regards warmth, light, ventilation, etc., are of some importance; and to them frequent reference must be hereafter made. The bed-clothes should be warm, but light, and the temperature of the apartment about 58° Fahr. A heated atmosphere is prejudicial to sleep, it being a matter of common experience that during a hot, airless, summer's night sleep is restless and disturbed, especially in children; this being due to the heat causing acceleration of

the action of the heart, with consequent hyperæmia of the brain. A low temperature is equally hurtful, and acts by causing contraction of the cutaneous blood-vessels, which is followed by cerebral congestion and insomnolency. This condition of things should be carefully guarded against by the aged, whose powers of resistance and reaction are feeble. The same effect is often produced by cold feet. In short, the most favorable conditions, as regards temperature, for securing quiet, refreshing sleep, are those in which the surface of the body is kept moderately warm and the brain in a state of partial depletion.

Next to a comfortable temperature, thorough ventilation is of the greatest importance. When circumstances permit, it is desirable to have the window open a little way at the top, taking care, by means of curtains and other devices, to protect the body from draughts. It is often possible to do this by opening a window in an adjoining room. In this way, contamination of the air with the products of respiration is avoided, for although carbonic acid may induce drowsiness, it does not cause sound sleep, its toxic effects being noticeable in the headache, languor, and disinclination to exertion present after sleeping all night in an ill-ventilated bedroom.

It is not desirable to sleep in a room containing plants of any kind.

Last year it was proposed ("Lancet," 1888) to induce sleep by interfering temporarily with the perfect aeration of the blood, by holding the breath after a deep inspiration until discomfort ensued, and repeating the process a few times.

If disturbing noises cannot be put a stop to, the ears may be plugged with cotton wool, or Dr. Ward Cousins' sound-deadeners employed.

It is hardly necessary to suggest the avoidance of all smells.

Light should be excluded by means of dark blinds, and light in the room dispensed with, except in the case of children, timid persons, or some sufferers from hysteria and hypochondriasis, to whom a well-shaded light is frequently a great comfort.

The bed ought to be yielding, without being too soft, the pillows moderately firm, and either high or low according to the taste of the sleeper. The conditions, in short, should be

such as to insure the minimum of external stimulations, which, as we have already seen, tend to prevent and disturb sleep. The writer is informed that the grievance of which some criminals complain most is the plank bed on which they are required to recline.

The best position of the body during sleep is that instinctively selected by the sleeper. The great majority of people sleep upon either side, the larger portion preferring the right side, while probably one out of every five assumes the dorsal position, which is generally considered to be the least desirable. The custom of assuming peculiar postures during sleep appears, in some cases, to be hereditary.

It has long been a popular opinion that lying with the body in a particular direction, north or south, improves sleep by allowing "the magnetic currents pervading the globe to exert a certain influence on the iron contained in the body." Much stress has been laid upon the advisability of placing the bed so that the head should point to the north.

Many years ago the writer's attention being directed to this subject, he made extensive observations and inquiries regarding it, but was unable to satisfy himself that it exercised any influence upon sleep at all, the apparent successes of the method being, in his opinion, accidental rather than consequent, or resulting from the imagination.

In sleeping in a train the head should be directed toward the engine.

It is important in the case of those whose work is chiefly mental, that a certain amount of bodily fatigue should be induced daily by exercise in the open air; if this is disregarded sleep is liable to be interfered with. Brain-work should be desisted from at least an hour before retiring, and conversation, light reading, or recreation indulged in. Ptolemy, king of Egypt, was wisely told that the best way to sleep "was to have divine and celestial meditations, and to use honest actions in the daytime."

He who would sleep well must go to bed "*animo securo, quieto, et libero.*"

The food must be proportioned to the work of the body and to the strength of digestion.

The last meal is an important one in connection with sleep. If a heavy meal, it ought to be partaken of from three to four

hours before going to bed. If food be taken at a later hour, it should consist of clear soup, which can be readily absorbed by the stomach, and farinaceous food, that the salivary ferment can change. In this way gastric, hepatic, and intestinal digestion—so apt to disturb sleep—is rendered unnecessary. The stomach should not be struggling with a burden, nor feeling the effects of want.

Insomnia is frequently benefited by climatic change. This is brought about by the altered physiological conditions influencing favorably the disturbance upon which it depends. In considering the therapeutics of a climate in this connection, it is wise to be guided, to some extent, by the previous personal experience of the patient, and to recollect that if sleep is faulty or imperfect it will more than counterbalance any benefit which might be derived from atmospheric change. It is a fact worthy of note that localities in which people sleep soundly when they are well, generally suit them, in this regard, when they are ill.

The duration of sleep must not be trusted as the sole guide in this matter, for the sense of recuperation, as has been already pointed out, is a more reliable one. There is a quality in sleep as well as a quantity; therefore it cannot be judged altogether by its duration. Such measures, by alleviating perturbing elements in the economy, toning the vascular system, and strengthening and calming the nervous centres, frequently suffice alone to palliate wakefulness and to restore natural sleep.

If in spite of these curative means insomnia persists, attention must be directed to the attainment of three points. The quiescence of excitability and activity in the psychical centres. This can be accomplished by means of remedies which act directly upon the nervous textures and calm the activity of the cells, thus allowing the blood-supply to slack off. The diminution and tranquillization of the cerebral blood-supply. (It has already been stated that cellular activity necessitates an augmented vascular supply, just as increased vascularization implies activity.) This can be achieved by medicines, chiefly tonics, whose properties act specially upon the great centres in the medulla, and through their agency quiet the heart and give tone to the blood-vessels, so as to diminish the force and volume of the blood current. The modification of the quality

of the blood. This can be brought about by medicines which increase the number of the corpuscles, or act favorably upon poisonous constituents. Sleep so induced frequently terminates in natural sleep.

Hypnotics act in various ways, some affecting one portion of the nervous system more than the others.

Dr. Lauder Brunton, in the Croonian Lectures already referred to, states that "hypnotics may probably lessen the functional activity of the cerebral cells, by causing their protoplasm to contract, and thus interposing a barrier of paraplasm between it and the oxygen brought by the blood, and by lessening the affinity of the cells for oxygen by diminishing their alkalinity, or by entering into actual combination with them for a time, and thus altering their chemical relationships."

Alcohol taken in the form of whiskey or brandy of good quality and in judicious quantity is probably one of the most reliable and least hurtful hypnotics we possses. Its efficacy has stood the test of time. Many members of the alcohol group act as hypnotics. They simply induce sleep as one of the first effects of their action. In larger doses, however, they may cause complete unconsciousness and anæsthesia and abolish the reflexes. For the production of prolonged sleep it is necessary to administer a remedy whose action is at once mild and of some duration, that the untoward results referred to may be avoided. For such a substance we look among the compounds which contain a heavy molecule, whether these are solid or liquid in form. It is usually best to prescribe them by the mouth, that they may be gradually absorbed into the blood and continue to act for a protracted time. Recently several new remedies have been introduced, which seem likely to take a high and permanent place in the materia medica. Among these must be specially mentioned sulphonal, chloralamide, and paraldehyde; and in a less prominent way urethane, hypnone, and the tertiary nitrite amylene hydrate. So far, no one of these has been found free from all objection, although they are very superior in many respects to the bulk of the older remedies.

Such a rapid advance is being made at present in augmenting this class of remedies, owing to the many new compounds which synthetical chemistry has brought into existence,

possessing strong hypnotic properties, that we may confidently look forward to the fabrication of one which will safely and benignly induce sleep.

The benefits to be derived from hypnotics are most conspicuously seen in acute diseases, such as inflammations, fevers, etc., where it is necessary to prolong life by conserving strength, until the natural crisis of the affection arrives; the greatest of all conservative agents being sleep. Every eight hours' sleep out of twenty-four represents an enormous saving of energy; the heart beating five thousand times less, the respirations being one thousand five hundred fewer, while the temperature remains at a lower point. If to this it be added that the products of waste are more perfectly removed from the system, it becomes apparent how very desirable sleep is in acute diseases, and particularly in those of the nervous system and of the lungs and heart.

In chronic affections, hypnotics fill a more limited sphere of usefulness; still, the benefits gained from a few nights' sleep secure at least three distinct advantages: time is acquired for the remedying of the ailment; the cerebral cells are rested and, with the whole body, are strengthened, thus permitting their excitability to subside; it often allows a sleep habit to be established. To this extent their use is helpful, and it must not be withheld.

It is, however, in such cases that one is apt to forget that hypnotics are not *per se* curative; to continue their administration indefinitely is to misuse them. Coincident with the widely-spread abuse of these drugs there has sprung up a fashion to inveigh against their employment at all, but it must be urged that drug-induced sleep is better than no sleep. There is a vast amount of evidence to prove that the use of hypnotics in strictly medicinal doses is not so detrimental to health as is commonly supposed. There are many men of advanced years, occupying high positions in this country, who for years, ay, for half a century in some instances, have never gone to bed at night without a soporific, and so far from suffering in health, have benefited by the practice. Although it is far from our purpose to advocate or countenance the use, and particularly the misuse, of drugs of any description, yet we must conclude that the experience of the efficacy of hypnotics, accumulated during centuries, is based upon a sound founda-

tion and must endure. Remedies which, skilfully selected and rightly administered, are able to conserve life, preserve reason, and, in less urgent cases, to influence an affection favorably, cannot be lightly discarded.

At the same time it must be remembered that many obstinate cases of insomnia can be managed and cured without the employment of hypnotics; and when that is accomplished it illustrates the truth of the old saying that "the best medicine is none."

If a patient awake during the night and is unable to fall asleep again, he should on no account lie tossing about worrying at his fate. Such a course invariably prevents the return of sleep. It is better to rise and walk two or three times round the room, brush the hair, take a drink of water, and then go back to bed. If that does not prove efficacious, he should light a candle, and take to a novel or other light reading, that he may occupy his mind. It is at once a comfort and an aid to sleep.

CHAPTER III.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE NERVOUS SYSTEM.

OVERWORK.

THIS term in the following lines is applied to conditions arising out of excessive mental effort; it refers to an undue strain on the intellectual apparatus.

In different persons the capacity for mental work varies very remarkably, one man being able to overtake easily an amount of labor, without apparent detriment to health, which another finds quite beyond his scope, both in quantity and quality. Every one has his own individual range, the limits of which he cannot exceed with impunity.

The term "overwork," then, is necessarily used in a relative sense. Its effects are chiefly seen in the literary, scientific, professional, and commercial classes, and in children; being largely caused by the fierce competitive struggle of the present day. It is one of the great sources of insomnia.

Reference has already been made to the fact that an inactive brain during waking moments (as in the condition known as "thought drifting") is comparatively bloodless, and of smaller size than when in active function. During mental operations some of the psychical areas are called into activity; the blood-vessels supplying these dilate, more blood is conveyed to the parts, and the brain increases in size. If the particular intellectual occupation is changed for another, a fresh group of centres is brought into requisition, which in their turn grow hyperæmic, while those first in use, becoming quiescent, resume their normal or comparatively anæmic state. (It has been clearly demonstrated by Mosso that hyperæmia of the brain is coincident with mental work. It seems legitimate to argue from analogy that this increased blood-supply is limited to the active portions of the brain, and not uniformly distributed to every portion. Therefore, while the writer is well

aware that no such localized anatomical apportionment has been shown to take place, he thinks it a very reasonable proposition, and it is certainly a very attractive and convenient working theory. The theory, moreover, appears to be justified on the further ground that the cerebral blood-vessels are terminal, and do not anastomose freely one with another. They are thus capable of vascularizing certain limited areas without increasing the blood supply of the brain generally.) These are healthy and physiological processes, just as needful for the proper nutrition, growth, and development of the brain and its powers, as are muscular contractions for the nutrition and development of a muscle; and as disuse in the latter case is surely followed by atrophy, so, in the former, does it lead to mental lethargy and decay of function.

When mental work of an arduous and engrossing kind is pursued, particular psychical sites are extremely active, and toiling at their highest possible pressure. At first, when the reserve fund of nerve force is considerable, the deleterious consequences of straining are not apparent, for during the hours of rest these sites recover their normal condition, and recuperative changes are effected, so that work can be resumed as usual on awaking. This is accomplished by means of the vaso-motor nerve, whose function it is to regulate the blood-supply to the amount of work being carried on.

When, however, this high pressure is obstinately maintained, there comes a time, sooner or later, depending mainly upon the stability of the nervous tissues, when these physiological arrangements begin to fail, and the active centres become weary, jaded, and irritable. The vaso-motor nerves, being inhibited during lengthened periods, grow exhausted and paretic, and become unable, on temporary cessation of mental work, to cause contraction of the blood-vessels as they ought to do, so that a condition of local chronic hyperæmia is excited in the particular centres in use, and these sites becoming exhausted, the case assumes a pathological aspect. It constitutes an example of derangement accruing from work imposed upon the cerebral textures being badly arranged and in excess of their powers. When this stage has been reached, work may still be carried on by a powerful effort of the will, but sleeplessness becomes pronounced, the general health gives way, and the breakdown is complete.

The symptoms which such persons present are tolerably uniform. Sleeplessness is one of the most urgent, being usually associated with throbbing blood-vessels and restless cerebration. When sleep does occur it is disturbed, unrefreshing, and accompanied by dreams, and as these are dependent upon activity in the centres called into function by the work enthralling the mind, the dreams are usually connected with one's daily toil.

Exhaustion and misery are felt in the morning; depression, despondency, and irritability during the day. All mental and physical work is accomplished with an effort, concentration of thought is difficult, and headache is seldom absent. The overworked man looks worn and anæmic, and has a soft, compressible pulse; although in some cases he is plethoric, with bright eyes and a hard, tense pulse. In both types, the brain and nervous system, being neither recuperated nor relieved of their waste products, innervate the various organs of the body defectively; and so dyspepsia, constipation, and palpitation of the heart are generally complained of; and the urine may contain oxalate of lime, or an excess of phosphates.

It will be gathered, from consideration of the foregoing sentences, that it is an exclusive or almost exclusive use, or rather misuse, of a particular and limited portion of the brain which leads to the portrayed disaster. An analogous instance of the same thing occurring in another system is to be found in writer's cramp, where the constant use of a particular set of muscles is followed by serious disorder. Another proof, if proof were needed, of the evil effects of prolonged and unvaried mental toil, is to be found in the fact that when insanity supervenes upon mental overwork, it occurs chiefly, if not entirely, among those whose work is of a protracted, monotonous, and undiversified description.

The import of sleeplessness is apt occasionally to be misapprehended. Some years ago the writer was intimately acquainted with a man who was engaged in literary work of a hopeful kind, and who, though obviously suffering from mental strain, was wont to congratulate himself upon his special power of dispensing with sleep, making calculations as to how many years of his life he had lost in sleep during the course of his career. For a long time he worked well on an allowance of six hours' sleep a night, for a shorter time upon

four, then upon two, and latterly he slept not at all. He turned a deaf ear to all warnings of the dangers which he was only too surely incurring, until the crash came in an extremely severe attack of meningeal inflammation, from which he eventually recovered, but only to be the wreck of his former self.

The evils of mental overwork are frequently manifested in children, owing to the pernicious system of cram which prevails so extensively at the present day. Their brains require an unusually large amount of sleep for the purpose of supplying the necessary pabulum for growth, as well as for the removal of the products caused by tissue-metamorphosis. This fact presents itself in a striking light when it is remembered that the male brain reaches five-sixths and the female ten-elevenths of its full size at the age of seven years. When children are encouraged to make great strains upon the highest cerebral centres, it frequently leads to brain irritation, or congestion, which shows itself in irritability and peevishness, headache, sleeplessness, or sleep accompanied by disturbing dreams, loss of appetite, and failure of nutrition and strength. If these symptoms are neglected or misconstrued, they may culminate in organic lesions, such as meningitis. Unfortunately, brains that are not allowed to grow naturally, but are forced, are apt to become permanently weak and unstable, and to be the cause of much trouble and misery in after-life.

Chorea, of which sleeplessness is so common a symptom, was found by the Collective Investigation Committee of the British Medical Association to be caused in seventy-one cases out of four hundred and thirty-nine by overwork, fifteen being males and fifty-six females. Sixty-three of these cases occurred in children between the ages of six and fifteen years, and eight between fifteen and twenty years.

Formerly the symptoms of overwork in children were commonly ascribed to worms or low fever, the victims being kept at home from school and dosed with drastic purgatives. These are excellent remedies for cerebral congestion, and can hardly be improved upon even now, though, with our extended knowledge and experience, they are seldom required.

Sleep is the best criterion as to the amount of work a child can do without injury to health. So long as sleep is sound

and dreamless the question of overwork need not be considered.

It has often been urged that work never kills, and probably healthy and well-arranged work never does. That badly-balanced, unvarying, and excessive work initiates pathological changes which, in children, lead to fatal terminations, and in adults to disastrous consequences, must be within the experience of every physician. There certainly can be no prolonged interference with sleep without the health becoming seriously compromised.

Treatment.—This will be most advantageously considered under the following heads: removal of the cause, diminution of the hyperæmia of the nervous centres, restoration of tone to the vaso-motor nerves, calming and strengthening the nervous centres.

(1) *Removal of the Cause.*—In most cases it is best to advise temporary cessation from all work until health improves and sleep returns. The resumption of work should be gradual, and the method subjected to careful re-arrangement upon strictly physiological lines. The amount of work performed need not necessarily be more limited than before, but it should be of a more varied character, its range being curtailed in some directions while it is extended in others.

(2) *Diminution of the Hyperæmia of the Nervous Centres.*—This may be accomplished in several ways. Among the most important is change in the character of the work. The benefit to be derived from this diversity is well illustrated in the lives of some of our greatest men. Leading statesmen, busy judges, those at the head of gigantic business concerns, all find it necessary to have hobbies, and find in them sources of relaxation and distraction from cares which would otherwise overwhelm them, and without which sleeplessness and its attendant evils would speedily supervene. It is of the highest importance that patients be advised to avail themselves of this physiological cure by devoting their attention to light reading, cards, billards, or some other amusement for an hour before going to bed.

The writer has long been of opinion that the benefit derived from billiards, wood-carving, playing musical instruments, such as the piano or violin, etc., is largely due to the number of cerebral centres called into requisition. The complexity

and precision of the fine movements imply high activity in some motor centres; the sensory centres are stimulated by way of the eye and ear; while at the same time the centres of intellectual operations are brought into activity in order to correlate the whole—a combination of circumstances the result of which will most probably be depletion of the hyperæmic centres.

Many devices based upon the same physiological grounds have been suggested as means of procuring sleep. The thoughts are to be concentrated, by an effort of will, on one subject, preferably a monotonous one, such as in imagination singing some melody, or counting sheep marching in single fill through a gate, counting numbers, or one's own respirations. A medical friend of great determination of purpose says that he is never conscious of counting more than seventeen sheep walking through a gate before he falls asleep. Smiles, in his work on "Life and Labor," relates that "a missionary troubled with sleeplessness repeated the Lord's Prayer till Satan sent him to sleep to get rid of it, and he says he never found the receipt to fail."

The difficulty is in directing the thoughts exclusively to the new subject, as it requires the greatest effort to inhibit the activity of the hyperæmic centres, and to prevent the ideas from returning to their accustomed channels; indeed, the artifice often fails for this reason.

Other expedients, the physiological effects of which are, to a large extent, of a similar character to the foregoing, are found in change of scene—from the country to the city, or *vice versa*—or in travel; while a well-planned walking tour, or a month's fishing, hunting, or shooting, for the more robust, are excellent hypnotics.

Wordsworth, who was manifestly acquainted with the usefulness of such aids to sleep, as well as with their occasional inadequacy, recounts them in the following lines:

> "A flock of sheep that leisurely pass by
> One after one; the sound of rain, and bees
> Murmuring; the fall of rivers, winds, and seas,
> Smooth fields, white sheets of water, and pure sky;
> I've thought of all by turns, and still I lie
> Sleepless; and soon the small birds' melodies
> Must hear, first utter'd from my orchard trees,
> And the first cuckoo's melancholy cry.

Even thus last night and two nights more I lay,
And could not win thee, Sleep! by any stealth;
So do not let me wear to-night away.
Without thee what is all the morning's wealth?
Come, blessed barrier between day and day,
Dear mother of fresh thoughts and joyous health!"

In these cases the writer relies much upon the use of the Turkish bath under medical advice, as a curative agent; for as a derivative, depurative, and tonic it has no equal, relieving the cerebral congestion and toning the nervous and circulatory systems, thereby aiding digestion and assimilation (Chap. XVII.). The lamp bath and the sitz bath, although inferior to the Turkish, are sometimes serviceable. Several other applications of hydrotherapy, which are all more or less useful in the cases under consideration, may be mentioned. One of these consists in douching the head with cold water at bedtime; and this may be combined with the use of moist applications to the feet and legs. Good effects are said to be got from a pair of wet cotton socks worn all night covered with a pair of thick woollen ones. The writer has frequently seen good results follow the use of wet towels rolled round the legs and worn during the night. Such appliances, however, occasionally prevent sleep by acting as disturbants. Of much more service than these partial remedies is the employment of the wet pack immediately before bedtime. Reference to this measure is made at some length elsewhere.

Bodily exercise is a valuable curative in these cases of insomnia, attracting a large supply of blood to the muscles and skin, and acting as a powerful derivative to the brain, while it increases cardiac action and vascular tension. On discontinuing the exertion these states are reversed; the heart beats more quietly, the blood-pressure is lowered, and sleep becomes possible. Exercise should be taken in the open air, and be proportioned to the strength of the patient, all fatigue being avoided. The form most desirable for a particular case requires some consideration. Walking, riding, gymnastics, etc., have each its special advantage; and in many instances, walking or riding to and from business is all that is necessary to promote sleep.

In those instances in which the general vascular tension is much increased, alkalies, combined with tincture of aconite,

may be advantageously prescribed, and their action is augmented by saline purgatives. In some few cases it may be necessary to resort to depletion, but dry cupping to the neck and upper part of the shoulders will generally suffice.

Restoration of Tone to the Vaso-motor Nerves.—Some of the foregoing measures will materially assist in accomplishing this object, but it is occasionally desirable to administer some tonic medicine, more particularly in those cases in which the vascular tone is relaxed. For many years the writer has prescribed, with most excellent results, a combination of nux vomica and hydrobromic acid.

℞ Acid. hydrobrom., ... ʒ vi.
Tinct. nucis vom., ... ʒ ij. vel ʒ iij.
Tinct. cichon. rub., ... ʒ vi.
Aquam, ... ad ℥ vi.

Sig. A tablespoonful in a wineglassful of water an hour before luncheon and dinner.

When the urine contains an excess of phosphates or oxalate of lime the following may be substituted:

℞ Acid. nitro-hydrochlor. dil., ... ʒ iij.
Liquoris strychnin., ... ʒ i.
Tinct. gent. co., ... ʒ vi.
Aquam, ... ad ℥ vi.

Sig. A tablespoonful immediately after meals, in water, thrice daily.

Calming and Strengthening the Nervous Centres.—To accomplish this it is necessary to direct attention to the general health. The patient should cultivate the habit of going to bed at a regular hour, and of rising with punctuality. The bedroom should be well ventilated, and the head raised upon a high pillow. The hours for eating and drinking must be laid down with precision, the diet being adapted to the temperament and digestive powers, the last meal being taken some three hours before going to bed. If dinner is an early meal, a cupful of some farinaceous food, such as milk arrowroot, is necessary before retiring. Tea, coffee, and tobacco are to be used in great moderation, if not discontinued entirely, and the excretory organs kept active.

No hard-and-fast rule can be laid down as to the employment of alcoholic stimulants, each case requiring separate and careful consideration. The plethoric, whose vascular tension is already high, do best without alcohol in any form; while the anæmic are often benefited by a moderate quantity taken with food to promote digestion, and a "night-cap" of whiskey or brandy, with warm water and sugar. For centuries the hypnotic effect of alcohol in combination with sugar and nutmeg has been recognized, strong ale and nutmeg being a favorite form for its administration. In this connection it is interesting to note that Horace, in his "Satires," gives an excellent prescription of Trebatius' for this form of insomnia; it is as follows: "Anointed let them swim the Tiber thrice who require a deep sleep; let them also have their bodies saturated with wine at night"—a combination of stimulant with exercise. On account of its stimulant and derivative action, turpentine in ♏ xxx. doses at bedtime is a powerful aid to sleep. It suits best in plethoric cases. Knowing how efficacious the late Dr. Warburton Begbie found it in the "headache of a fatigued brain," the writer was induced to prescribe it in this class of cases, and his anticipations were abundantly realized. It yields equally good results in worry. It is easily taken in capsules, which usually contain ♏ xv. each

If the remedies detailed fail to accomplish the end in view, we must resort to the use of hypnotics, which, by their soothing effect on the irritable nervous textures, are calculated to induce sleep, and, in so doing, to restore tone to the exhausted and enervated tissues. There are many agents from which to choose. The bromides are especially applicable in cases of insomnia arising from overwork, the only contra-indication to their use being anæmia, on account of the tendency which these drugs have to lead to an impoverished state of the blood, and this itself is a cause of sleeplessness.

The bromide of lithium of the United States Pharmacopœia is the best hypnotic of the bromide salts, as it contains a half more bromine than the potassium bromide. Its dose is from ten to twenty grains. The bromides of sodium and potassium, which are in most frequent use in this country, are given in doses of ʒ ss. to ʒ i. They are best prescribed in syrup and water, a full dose being taken two hours before bedtime, and another at bedtime. If these doses do not succeed in procur-

ing sleep they may be associated with ergot of rye and digitalis, both of which are stimulants of the vaso-motor centres.

℞	Bromidi lithii, ...	gr. xl.
	Extracti ergotæ liq., ...	ʒ i.
	Tinct. digitalis, ...	♏ xx.
	Aquæ chloroformi, ...	ʒ xv.

M. Sig. Take one-half two hours before going to bed, and the other half at bedtime.

If the bromides fail to induce sleep after eight days' trial, their use should be discontinued.

In anæmic cases where it is advisable not to give the bromides, sulphonal, paraldehyde, or urethane may be tried, as they are each suitable drugs.

In children, treatment should be conducted on like principles, badly arranged work being interdicted and the child removed from school and placed for two or three days in bed in a quiet, cool, and darkened room, with cold applications to the head, a tepid bath being given night and morning. The food should be light and bland. A purgative may be required, as well as potassium bromide in doses of one grain for every year of age, thrice daily, in some sweetened water.

If the symptoms of irritation do not speedily subside, six or eight leeches must be applied to the temples, all subsequent bleeding being checked.

After all headache and restlessness have disappeared, a change of air and scene will complete the cure. It is better to avoid the seaside.

When the child returns to school it must be stipulated that its lessons be more varied, and that it should play for at least half an hour after each meal.

The following table is one modified by the writer from that of Friedländer, and contains his views as to the best division to be made of the twenty-four hours in the matter of rest, work, and sleep.

Age.	Hours for— Exercise.	Work.	Leisure.	Sleep.
7.....	7	3	4	10
8.....	6	4	4	10
9.....	5	5	4	10
10.....	5	6	4	9

Age.	Hours for— Exercise.	Work.	Leisure.	Sleep.
11	5	6	4	9
12	5	6	4	9
13	4	7	4	9
14	4	8	3	9
15	4	8	3	9

Dr. Dukes, of Rugby, is of opinion that boys under ten years of age require eleven hours' sleep, and that those under thirteen need ten hours and a half set aside for this purpose. In his work on "Health at School" he writes: "The tendency in schools is rather toward too little than too much sleep; in fact, in public schools I think boys scarcely get enough, especially the younger ones; and were it not for the holidays coming every twelve or thirteen weeks, I do not believe they could do their full share of work and yet continue in health."

Shock.

Sleeplessness from shock is not so frequently met with in practice as to entitle it to a very prominent place in a work on insomnia; but as the facts connected with it will serve to illustrate much that is to follow, a brief reference will be made to its effects upon the nervous system.

Shock may be caused by any severe injury or excessive pain, or by overwhelming mental emotion. It varies in severity with the nature and extent of its cause, and affects some individuals much more profoundly than others. The difference depends upon the age, sex, habits, temperament, and more especially on the stability of the nervous system. In illustration of this, the writer some years ago made a post-mortem examination of the body of a man who had died from extensive fracture of the base of the skull with hemorrhage. The history showed that he had sustained an injury about 12 noon, after which he walked home, a distance of two miles. In the evening he visited a neighboring tavern, where he drank freely, and only made casual reference to his accident. On going home he went to bed, and died during the night. In contrast is a case seen more recently, in which a man lay pulseless for many hours, with the heart beating inaudibly, after a trifling injury from a knife which merely punctured the skin and did not involve the loss of a drachm of blood.

This difference in constitution well explains the varying degrees of sleep disturbance following shock.

Shock causes a rapid depletion of the brain and cutaneous surface, and interference with the normal irritability of the psychical, motor, and sensory centres; respiration and circulation are deranged, and the temperature of the body is lowered. These conditions combine to bring about a partial paralysis of the heart, and a sudden dilatation of the abdominal blood-vessels, which are found after death from shock to be enormously distended, while the vessels in the rest of the body are comparatively empty. The result of this sudden flushing of the vessels of the abdominal viscera is that less blood than usual reaches the feebly-acting heart, and the brain and surface of the body are rendered anæmic.

Sleeplessness, often of a pronounced character, follows; and it may continue during months or years.

In many cases the cardiac and vaso-motor centres never seem to recover their tone, as in the following case. A healthy lady, aged sixty-four, had the misfortune to fall upon the pavement, and although she sustained no injury to the bony structures, she suffered severely from shock and died six weeks afterward, notwithstanding every care. Throughout her illness she had no natural sleep, vomited everything she swallowed, and sweated profusely; in short, the symptoms were all referable to grave disturbance in the medulla oblongata.

Shock is not seldom the originating cause of organic heart disease, even when no lesion can be diagnosed at the time, and in many cases the cardiac disorder still further disturbs sleep. Shock depending upon sudden mental perturbation is accountable for a certain percentage of all cases of insanity; and it is capable of arresting the menstrual flow and the secretion of milk and of the digestive fluids. To severe cases of shock, or to the slighter cases which quickly recover, we shall not allude further. It is with those of medium severity that we are chiefly concerned—cases which recover speedily up to a certain point, then progress less satisfactorily, and end in an extremely protracted convalescence. During their progress the nervous system is excitable and impressionable, the chief, constant, and persistent symptom being insomnia, or imperfect sleep disturbed by distressing dreams from which the patient commonly awakes in a state of terror.

Treatment.—The most urgent indication at the time is to establish reaction, and to restore the equilibrium of the circulation without unduly exciting it. The shorter the duration of the shock, and the more complete the restoration of tone, the less likelihood will there be of sleeplessness resulting. Hence the necessity for adopting adequate measures at the onset. This is so widely recognized that surgeons invariably resort to the use of morphine or opiates after severe operations.

If sleeplessness appears after reaction is established, and persists when the stage of convalescence is reached, there is need to administer remedies which will act powerfully upon the enfeebled centres in the medulla, so that the cardiac and vascular tone may be recuperated. Probably the most powerful remedy we possess is strychnine. Its stimulant action upon these centres is slower in manifesting itself than when sulphuric ether is used, but its effects, once secured, are much more lasting, its elimination requiring almost as many hours as ether does minutes. It is best administered hypodermically, and the salts most suitable for the purpose are the nitrate and the acid sulphate. From $\frac{1}{70}$ to $\frac{1}{60}$ of a grain, repeated three or four times in twenty-four hours, is usually sufficient, although these doses may be cautiously increased up to $\frac{1}{16}$ or $\frac{1}{12}$ of a grain. Tincture of nux vomica may be injected in ten-minim doses instead of strychnine, but the pain it causes lasts for two or three hours. Either remedy can be given by the mouth, when it is highly advantageous to combine it with quinine, for that medicine exerts an exceedingly tonic influence over the nervous and vascular systems, and is especially useful in anæmia of the brain and medulla oblongata. The following is the formula the writer has used for many years:

℞	Liq. strychnin., ...	ʒ i.
	Sulph. quinin., ...	gr. xx.
	Acid. hydrobrom., ...	ʒ vi.
	Infus. serpentar., ... ad	℥ vi.

M. Sig. Take a tablespoonful in water, three times a day, between meals.

Phosphorus, by increasing the circulation of the brain and acting as a tonic and nutrient to the nervous system, is also found useful in these cases, and is best given in doses of $\frac{1}{60}$ of

a grain three times a day, the elixir of phosphorus (Martindale's) and the perles of phosphorated oil being good forms for its administration.

Calabar bean has been suggested, but of its use in this condition the writer has no experience.

It is usually necessary to resort to the use of hypnotics for a few nights for the purpose of securing sleep, which is, par excellence, the most potent recuperative agent of all; and for this purpose opium, or its alkaloid morphine, is especially indicated, as it is in all anæmic states in which insomnia is a prominent symptom.

The following is a useful pill:

℞	Ext. opii,	gr. ss.
	Ext. belladon.,	gr. ⅓.
	Pulv. digital.,	gr. i.
	Pulv. camphor.,	gr. ij.

Ft. pil. i. Sig. Take at bedtime.

Morphine administered hypodermically in doses of $\frac{1}{10}$ to $\frac{1}{8}$ of a grain, in most cases, insures a good night's rest. Of the many preparations of morphine, the writer thinks the tartrate the best for general use, on account of its solubility. It is often advantageous to combine it with $\frac{1}{100}$ of a grain of atropine sulphate, which checks the tendency to vomiting which morphine so frequently causes immediately after it is injected, while it appears to augment the hypnotic properties of morphine. Atropine alone is a valuable therapeutic remedy in all cases of reflex cardiac inhibition, such as obtains in shock.

The food should be nourishing and easily digested, and the bowels, if constipated, regulated by some mild laxative, such as aloes combined with belladonna or henbane. Alcohol in the most suitable form must be allowed, so long as it aids digestion; and everything that is likely to inspire the patient with confidence and hope must be sedulously considered and adopted.

Depressing Emotions.

Prolonged depressing emotions, such as anxiety, grief, worry, etc., are frequent sources of insomnia, and though usually classed with overwork, the symptoms of which they closely resemble, they differ in certain important respects, one

being that overwork may cause sleeplessness to arise in the hopeful and vigorous, while worry is always more or less associated with hopelessness. From the earliest times mental perturbations have been recognized as inimical to sleep. Hippocrates notes as a fact that "the insomnolency is connected with sorrow."

Burton gives the following quotations from Crato which point in the same direction: "Grief, cares, expectations, anxieties, great businesses, and all violent perturbations of the mind must be in some source gratified before one can hope for any good repose. . . . He that is in suspense, fear, or in any way troubled in mind can never rest at night."

The effects of such emotions are truly credited with being more baneful than those of overwork, with which they are often, though not necessarily, associated; and they appear to depend on a combination of circumstances. Emotion, of whatever form, implies activity in the emotional regions of the brain. In worry these parts, from being in constant function, get into the same pathological condition of exhaustion and congestion which we described as resulting in the psychical sites from overwork. Upon this fact is based the physiologically true saying that "fifty worries are better than one worry," for in the former case the sites of activity are altered from time to time, and the strain, being distributed over a wider area, is better borne than when the mental disturbance is due to one never-changing cause. This, however, is not the whole case, for the effects of mental emotions upon the sympathetic nervous system require to be taken into account. If they are pleasurable, these centres are stimulated to greater activity, and this, being reflected along the whole circulatory apparatus, gives rise to feelings of comfort and exhilaration. If, on the contrary, these emotions are of an opposite kind, the effect on the nervous centres is such as to cause circulatory modifications of an atonic character, which are followed by general depression and mental suffering. These vascular changes are due to inhibition of the cardiac and vaso-motor centres similar to that occurring in shock, but more gradual and insidious in their onset, as was well expressed by Dr. Hughlings Jackson in the following words: "Fright and anxiety—which latter is only fright spread out thin." This inhibition leads to defective innervation of the

heart and gastro-intestinal canal, which brings in its train cardiac derangements and digestive troubles, with consequent disordered nutrition. In most cases vascular tension is relaxed, and in all sleep is seriously interfered with, being either absent altogether, or imperfect, and disturbed by nightmare and dreams. The conditions, in short, brought about by depressing emotions are similar to those which result from overwork, with a modified amount of shock superadded.

The effects of worry, etc., expend themselves upon the feeblest portion of the nervous textures, and consequently are most frequently seen in sympathetic persons whose emotional centres are weak and impressionable. They are often developed in severe forms in females, and are always modified by age, temperament, general health, and the source of the worry. A patient so afflicted presents a downcast and dejected aspect, the face is drawn and haggard, the eyes are dull and expressionless, while vision is dim, and the pupils react to light sluggishly.

Mental depression and misery are complained of, with headache, confusion of thought, loss of memory, lassitude, and disinclination for exertion. The heart is weak and palpitates, and not infrequently the functional derangement ends in organic change, the explanation of which is sufficiently obvious. Worry, as has already been hinted, consists of a series of small shocks, following upon each other more or less rapidly, and at each shock, small though it be, the heart is temporarily inhibited and fails to expel its contents thoroughly, so that at the next systole it has to deal with a larger amount of blood than usual. The consequence is that the weakened muscular walls yield under the strain, and dilatation occurs.

The appetite is poor, and the patient suffers from flatulence, acidity, heartburn, and constipation or relaxation of the bowels.

The urine may contain phosphates in excess, or oxalate of lime, or traces of sugar or albumin. It is often copious and of low specific gravity, and, in fact, presents all the characteristics of the urine of chronic Bright's disease, of which worry is sometimes the only recognizable cause. The patient usually loses flesh quickly, in consequence of defective metabolism, and if his condition is not ameliorated he gradually merges into the more pronounced condition of neurasthenia.

We may here remark in passing that the effects of grief have frequently been studied in animals, notably in dogs; and cases have been recorded in which they proved fatal.

Treatment.—It is important in the first place to ascertain the source and nature of the worry, so that if it has its origin in some bodily ailment, such as varicocele, the cause may be removed. In many cases, however, the patient seeks advice for insomnia, or dyspepsia with disturbed sleep, and so far from hinting that it is due to grief, he seeks to conceal his sorrow, and it requires delicacy and tact to overcome reticence and to obtain a frank confession of the trouble.

If it is a monetary anxiety, the physician might prove himself a magician if, instead of writing a prescription, he could give an order upon his banker for the needed amount. Unfortunately few physicians have it in their power to do so, and those who have do not appear to think of it! If it is due to the strain of over-speculation or gambling, which keeps the cerebral cells ever on the *qui vive*, watching constantly for telegrams, until every ring at the bell acts like a shock, hoping and fearing by turns, little good can be done until the ill-used cells are released from their bondage of uncertainty and suspense. The physician's powers are likewise limited in cases of anxiety about personal health, or that of friends, or when grief depends upon bereavement, or, still worse, upon living sources of sorrow. There is one thing, however, that the physician has in his power—he can bring a clear and unbiassed mind to bear upon the case, and by judicious advice and counsel he may go a long way toward putting the sufferer into a condition for bearing his trials manfully. He may also help him greatly with his burden by securing repose for his wearied brain and by bracing his heart and arterial system.

In cases in which the general health is not greatly implicated, the best of all remedies is work of a good and hopeful kind, perseveringly maintained. It calls the psychical centres into operation, and by withdrawing the excess of blood from the emotional centres, the latter gradually obtain the repose they so much require, and their hypersensitive condition, which responded to the most trifling impressions, soon becomes less marked. Many a man has reason to be thankful for the blessing of work which enables him to bury his worry, for the time being, in oblivion. If work does not form a part

of his every-day life, it is essential that he should find some healthful and wise enterprise in which he can engross himself. The alternation from idleness to healthy employment is the best and the only physiological change that he can obtain. All that was written on the subject of a second occupation, regimen, diet, stimulant, exercise, change of scene, when discussing the treatment of overwork, and much of what has still to be added regarding the treatment of neurasthenia, might be repeated here, but to these remarks the reader is referred.

In pronounced cases, the stimulating effects of the morning bath must be proportioned to the strength of the patient. The more robust may employ cold, but the weakly should use tepid or warm water, exposing the body during the process as little as possible, and employing the flesh-brush freely. The Turkish bath and sitz bath are both useful in these conditions, and if the Turkish bath is advised, the patient should be recommended to "finish" with the spinal douche.

At night besides douching the head with tepid water, and using the other means already referred to, several applications may be tried to promote sleep, among them sponging the nape of the neck and spine with very hot water, or merely rubbing the spine firmly with a warm hand until redness of the skin is produced. Kneading and rubbing the abdomen appears to produce hyperæmia of its contents with a corresponding anæmia of the brain. This may perhaps simulate in a very moderate degree the results obtained by Goltz, who, by smartly tapping on the belly of a frog, drew into its abdominal vessels the most of the blood in the body, by paralyzing the splanchnic nerves.

A mustard plaster applied over the abdomen has a most soothing influence, causing contraction of the blood-vessels of the pia mater, which is favorable for sleep. It should not be kept on longer than ten or twelve minutes, else it may cause so much local irritation as to defeat the end in view; nor must it be applied over the region of the heart, as the stimulation of that organ is inimical to sleep. Dr. George Keith, who formerly practised in Edinburgh, mentioned to the writer that in some cases it did not act so beneficially if placed over the lower part of the abdomen; a clinical observation which he could not explain. This fact militates against the simple theory of a transposition of blood from the cerebral to the

abdominal blood-vessels. When the plaster is taken off, the part should be sponged with warm water to remove any adherent particles of mustard.

The hot foot-bath at night acts in some as a hypnotic. In fairly nourished cases quinine and strychnine are, as in shock, useful and powerful agents.

℞ Sulph. quinin., ... gr. i.
Sulph. strychnin., ... gr. $\frac{1}{10}$.
Ext. gentian., ... q. s.
Ft. pil. i. Sig. Take one before meals thrice daily.

Arsenic may in some cases be combined with these remedies, for as an alterative and tonic it has few rivals, strengthening and calming the nervous system.

℞ Tinct. quinin., ... ℥ i.
Liq. strychnin., ... ʒ i.
Liq. arsen. sodii, ... ʒ ss. vel ʒ i.
Infus. serpentar., ... ad ℥ vi.
M. Sig. Take a tablespoonful in water, after meals, thrice daily.

If the heart is irritable, and there is great relaxation of vascular tension, digitalis must be added.

℞ Tinct. digital., ... ʒ ij.
Liq. strychnin., ... ʒ i.
Liq. arsen. sodii, ... ʒ ss. vel ʒ i.
Infus. calumb., ... ad ℥ vi.
M. Sig. Take a tablespoonful, in water, three times a day after meals.

In the anæmic and badly nourished, when the digestive powers will bear the use of iron, few remedies surpass the syrup of the phosphates of quinine, strychnine, and iron (Easton's syrup), in doses of one teaspoonful in water after meals three times a day. Iron may also be prescribed in a pill.

℞ Ferri. redact., ... gr. iij.
Sulph. quinin., ... gr. i.
Ext. nucis vomic., ... gr. ss.
Glycer. tragacanth., ... q. s.
Ft. pil. i. Sig. Take one after meals three times a day.

Notwithstanding all that has been written against phos-

phorus and its efficacy, the writer has reason to be satisfied with the results he has obtained from it; besides the elixir and perles, it may be given in the form of the phosphide of zinc in a pill containing from gr. $\frac{1}{10}$ to gr. $\frac{1}{2}$. It may also be prescribed in combination with quinine and strychnine, which emphasize its effects.

℞ Phosphid. zinc., ... gr. $\frac{1}{10}$ vel gr. ss.
Sulph. quinin., ... gr. i.
Ext. nucis vomic., ... gr. ss.
Ext. gentian., ... q. s.
Ft. pil. i. Sig. Take one after meals thrice daily.

When these remedies and regimen fail to induce sleep, it becomes absolutely necessary to resort to the use of hypnotics, for no appreciable improvement can accrue until sleep recuperates the nervous system. It is only when the distressed mind is oblivious to its sorrows that the cerebral cells can recruit their tone. For this purpose chloral hydrate may be prescribed, as it is probably one of the most powerful pure hypnotics we possess, though its employment is so fraught with risk that its use, except under medical advice, is much to be deprecated. The number of deaths that have followed its indiscriminate use warrants this warning. Its administration should not, under any circumstances, be long persevered in, on account of its depressing effects. Its use in the cases of neurotic patients should be carefully considered, they being very liable to acquire the chloral habit, to which we shall refer hereafter. It is best given in doses of 20 to 25 grains with syrup of tolu at bedtime, and it can be repeated in an hour if it is required. Its efficacy is augmented by potassium bromide.

℞ Hydrat. chloral., ... ʒ ij. vel ʒ iiss.
Bromid. potass., ... ʒ i.
Syr. tolu., ... ʒ iss.
Mist. camph., ... ʒ xivss.
M. Sig. Take one half at bedtime, and the other half in an hour if required.

In the weakly, when chloral hydrate is deemed to be too depressing, paraldehyde often answers well. The usual dose is said to be from 15 to 50 grains; to insure sleep 45 to 50 grains are required. Some think that from ʒ i. to ʒ ij. is the

proper dose. The following formula has afforded the writer excellent results:

℞ Paraldehyd., ... ♏ xlv. vel ♏ lx.
Syr. tolu., ... ʒ i.
Infus. caryophyll., ... ʒ xi.
M. Sig. Take at bedtime.

Like all other hypnotics, the system becomes tolerant to its use; it should not therefore be administered for more than six or eight nights consecutively.

Bromidia, though a proprietary medicine, has in several instances been found reliable, in drachm doses given in syrup and water at intervals of an hour until sleep is induced.

Sulphonal upon several occasions has yielded the writer most excellent results, so much so that he believes this remedy to be a real addition to the list of hypnotics. He gives it in doses varying from 20 to 30 grains made into an electuary with honey, two hours before bedtime, and directs that warm water or very weak toddy should be taken shortly afterward to promote its solution in the stomach.

Urethane and hypnone have both been prescribed with good effect, but they seem to be less reliable than the hypnotics already mentioned.

Closely allied to the conditions caused by depressing emotions is that state of mind produced so frequently in children by fear. Fear is merely a modification of fright and, like it, gives rise to nervous shock with its usual accompaniments. Some children are naturally timid and afraid to remain by themselves, or to go to bed in the dark. When a strain of this description is put upon them, the emotional centres tend to become active and hyperæmic, while the volitional centres are dominated, and loss of voluntary control is the result. Such patients require careful consideration and management; bullying and jeering only make matters worse, while a light in the bedroom or the presence of some one within call inspires confidence, and allows the emotional centres to calm down, and natural sleep to ensue. With kindly treatment and encouragement the dread of the unknown disappears with advancing years and increasing strength. As regards therapeutic measures, the bromides will be found the most suitable as well as the most efficacious. Sulphonal has been found worthy of trial in these cases.

CHAPTER IV.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE NERVOUS SYSTEM—*Continued.*

NEURASTHENIA.

CEREBRAL and spinal neurasthenia are names applied to certain obscure conditions which are the most common of all causes of insomnia. They are characterized by irritability and exhaustion of the brain or spinal cord, as the symptoms are able to be referred to either of those centres respectively. In many cases they indicate that both are implicated. The symptoms differ very considerably in severity in various cases, amounting in some to mere "nervousness" and in others to profoundly marked neurasthenia.

The causes are of the most variable kind, and the sufferers have their symptoms biassed in a remarkable way by their temperament and mental and physical development, as modified by education, self-training, habits, and social position. It occurs mostly in those who have an hereditary tendency to nervous diseases, and who possess a neurotic temperament. It affects males more frequently than females, especially males in early middle life belonging to the wealthier classes who may previously have been robust and muscular men.

The symptoms follow in the train of many circumstances which tend to produce nervous prostration. It is a disease of fatigue, in which the expenditure of nervous energy has exceeded the recuperative powers of the economy. The mental causes include prolonged mental toil, protracted excitement, depressing emotions, such as worry, grief, anxiety, ungratified ambition or desires, etc. The physical causes embrace great and prolonged bodily fatigue, all excesses, or discharges, the immoderate use of alcohol and tobacco, living under unhealthy conditions, and food deficient in quality and quantity. The symptoms may appear in the convalescence from severe diseases, fevers, anæmias, cachexias, and in the disorders of nutri-

tion. In females, from drains upon the system, too frequent pregnancies, and over-suckling. In the young adult from defective nutrition, badly-balanced mental work, and physical over-training.

In the great majority of cases, these causes have been associated with insomnia for lengthened periods of time, an aggravation which has accelerated the breakdown. The first indications of the exhaustion or prostration are referred to the brain and nervous system, which in their turn display their enfeeblement by signs of irritability and instability in the whole nervous apparatus, including the vaso-motor centres. The whole body is made to feel the lack of efficient innervation (the heart, digestive organs, etc.), and this, in the course of time, leads to deficient and imperfect nutrition, which vastly adds to the exhaustion. The symptoms belong to the different organs and viscera. There is a profound sense of the loss of energy and power, with failure of mental vigor and memory, accompanied by a feeling of depression (mental pain) and despondency. The power of will is enfeebled, leading to uncertainty of temper and unreasoning obstinacy. At all times irritable, vacillating, and self-conscious, these individuals dwell watchfully upon various sensations, and with ever-increasing introspection become timid, and live in the constant dread of the unknown happening. Every little trouble appears to overwhelm them. Some are afraid to be left alone in a room, or to travel by rail; others have a dread of fire, or that they will lose their reason, or become the victims of some deadly disease. They complain of swimming in the head, headache occipital in character and often accompanied by tenderness of the scalp, giddiness, uncertainty in movements, noises in the ears, and neuralgic pains in various parts of the body, dimness of vision, intolerance to strong light, and often of specks floating before the eyes, while sighing and yawning are frequently present. The pupils may be dilated, and the dimness of vision may depend upon errors of refraction, which in health could be overcome by muscular effort, but which the exhaustion renders impossible. In other cases no ascertainable ocular lesion exists, and the weakness of sight is extremely variable, being made worse by fatigue, and improved by food and stimulant; it is worst in the morning and best in the evening.

In the cases where the symptoms are chiefly referable to the spinal cord, besides suffering from some of the foregoing symptoms, these patients complain of utter prostration greatly exaggerated by even slight exertion, accompanied by stiffness, cramps and pains in the muscles (which are probably due to the coagulation of the myosin), most marked after resting for a short time and subsequent to some exercise; and also of muscular twitchings and fibrillar tremblings—the physiological signs of fatigued muscular fibre.

Pain is referred to the lower part of the spine or to the nape of the neck, and is due in many cases to spinal anæmia, or hyperæmia, both of which conditions, causing disordered nutrition of the nerve cells, give rise to similar symptoms. These symptoms vary in different cases according to the portion of the cord affected.

Sensations of numbness, formication, or pins and needles, are invariably more or less decidedly present. The upper extremities may participate in the weakness, and in some cases there are pseudo-spasms of the hand and fingers, associated with more or less persistent numbness. Usually the weakness is mainly referred to the legs, the patient observing, "If I had to fight, I should have to sit down to do so." The patellar tendon reflex is sometimes exaggerated, and occasionally the ankle clonus may be elicited in a faint degree, though this varies from day to day, and as recovery takes place excitability disappears.

Neurasthenics are dyspeptic, the digestive derangements depending upon the defective innervation of the various processes. The appetite may be impaired, but in the majority of cases it is increased, and there is a craving for food and stimulant which for a time dispels the symptoms. Flatulence, constipation, or looseness of the bowels, uneasy, even painful sensations, and pulsations in the abdomen, are frequently prominent and troublesome symptoms. One patient compared his abdominal discomfort to the contents being grasped by a strong claw or vice. These dyspeptic troubles aggravate the mental gloom, and, combined, they lead to functional disorders of the liver.

There is cardiac weakness, the heart's sounds and impulse are feeble, pulse weak and compressible; although often slow, it is readily quickened by exertion. There are abnormal

sensations in the region of the heart, with uneasy pain causing faintness; the patient often, besides sighing, complains that he cannot draw a long breath, or "get to the bottom of it." In some cases there is weakness or irritability of the bladder, and the urine may contain oxalate of lime crystals, phosphates in excess, urates, uric acid, and occasionally traces of sugar, and sometimes albumin with a deficient excretion of urea.

These patients are extremely susceptible to draughts and to changes of temperature; cool, bright, and bracing weather suits them best, their lassitude and disinclination for exertion being much increased in warm, close weather.

The personal appearance is variable; in some it is remarkably little altered; others look haggard and worn out; most look older than their years. The hair is dry and lacks lustre, tends to fall off and to become gray; the teeth begin to decay; the skin is either clammy and moist or dry and scaly, and quickly loses the suppleness of health. In young adults the symptoms are accompanied by a listlessness and apathy which is very characteristic. If it arises from over-training, it is ushered in by a loss of muscular and nervous energy, loss of pluck, headache, and feverishness.

The two symptoms, however, which demand and receive most attention are, first, a loss of flesh which is quite remarkable, being as great as that which occurs in connection with organic disease, and, second, sleeplessness, which is a distressing and pronounced feature in probably three-fourths of all cases. It is probably due mainly to exhaustion and irritability of the nervous centres depending upon malnutrition, and in a less degree to circulatory derangements arising from the impressionability of the vaso-motor centres. Patients usually fall asleep soon after going to bed, to awake in one, two, or three hours, and to remain awake for the rest of the night; or if they get to sleep again, it is only for an hour or so before the time of arising, and their doze is disturbed and uneasy. During their wakefulness, apparently from irritability and congestion of the motor centres, they are restless, fidgety, and occasionally require to get up and wander about. In almost all cases they rise in the morning more weary than when they went to bed. Many patients are accustomed to estimate the amount of sleep they get by their feelings of re-

cuperation the following day; sometimes they say, "I must have got more sleep than I thought."

Besides being urgent symptoms, the emaciation and insomnia have a special prognostic value. All improvement being preceded by a gain in weight, a relapse may equally be predicted from a loss of flesh. Dr. Beard writes: "So one of the first signs of improvement, the earliest evidence that the treatment is doing the work designed, is sleep sounder and more of it, less troubled dreaming, less nightmare, less restlessness." There cannot certainly be any amelioration of the symptoms without increased nutrition and sleep.

The onset of the symptoms is usually gradual, amounting at first only to a depression or lowness of spirits, from which the patient recovers to relapse again into a condition in which they are more pronounced. When the symptoms are marked they may resist treatment for lengthened periods, even years, but under proper conditions the prognosis is favorable.

Relapses are frequent; patients impatient for speedy results cannot obtain them; the recuperative process is always slow and gradual.

Treatment.—Dr. Clifford Allbutt, in his third Gulstonian lecture on visceral neuroses, in 1884, spoke some truths which are particularly applicable here: "The beginning of all successful treatment must be to convince the patient of the true nature of his malady. Now, your neurotic is one who has no reserve. This want is probably due to a congenital instability of nerve, showing itself as waste, so ceaseless, that the reserve once dissipated is never reaccumulated. This reserve may have been spent in beneficent activities, or it may have been dissipated in fidgets, fretfulness, or shrewishness; in sleeplessness, in anxiousness, or in pain, according to the quality of the person. We are disposed to forget that the silent work of nutrition uses more force perhaps than many people expend in their neuro-muscular life; hence the early failure of the digestive resources in neurotics, hence the fall of the balance of nutrition below the needs even of a controlled expenditure. We know that good nutrition is a chief condition of steady work, good temper, and self-control; we know, too, that to trade daily only upon the supplies of the day is to court collapse; we must have more brain, more spinal marrow, more liver, more kidney than we want for the day." This powerful

and explicit statement indicates the end to which the treatment must be designed and directed.

The causation of the neurasthenic state must be diligently investigated, with the view of discovering the faulty physiological arrangements in the patient's life that have brought it about, that they may be amended; and this is the more urgently called for when it is realized that the diagnosis of the affection can only be arrived at *per viam exclusionis.* When the condition has been induced by excessive mental work, shock, depressing mental emotions, or prolonged excitement, the reader is referred to the preceding chapter, which treats of these subjects, and which must be taken in connection with what is to follow.

When it has been caused by prolonged bodily fatigue, physical over-training, sexual excesses or masturbation, these indiscretions must be most strenuously interdicted.

If it has resulted from excessive drains on the system, as in spermatorrhœa, leucorrhœa, menorrhagia, or over-lactation, these exhausting influences require special treatment that they may be remedied. Uterine derangements must be rectified; unhealthy surroundings abandoned; disorders of nutrition and digestion critically inquired into and relieved; and in each and every case sleep must be secured.

The patient must be carefully imbued with the fact that his symptoms do not depend upon organic mischief; that to a large extent his convalescence depends upon his doing exactly what he is advised to do; and that if he does this, and avoids all things likely to weaken and depress him further, he will probably recover his health in time.

The building up of nervous force is at all times a difficult task, as the centres discharge their energy under the most trifling provocations, which leads to relapses, and of this the patient should be warned, so that he may not be too downcast when they do occur. He must be inspired with hope and confidence, and have his life arranged upon strictly physiological grounds, in which food, stimulant, and mental and physical work should be well balanced, and bear an intimate relation the one to the other. If the symptoms are very urgent, he must be advised to give up regular employment, and to rest the jaded brain by calling into use new psychical centres, through new channels of thought. What direction or form

this new work should take must be determined by the patient himself, *sua cuique voluptas;* the physician can only indicate its necessity. Carlyle wrote these words: "The modern majesty consists in work. What a man can do is his greatest ornament, and he always consults his dignity by doing it." To ask a patient to give up his usual occupation without explaining the need for a new one, is to intensify his sufferings; for mental work of a new and pleasurable kind not only tends to deplete the over-wrought centres, but by its distraction to dispel gloom and depression, and to render him less conscious of his woes, which to him is of no small import. Happier mentally, the control of temper will become easier, he will be able to dominate himself, and will lose much of the mental indecision which is so distressing to those to whom it was unknown in former years. Vacillation will be replaced by determination of purpose, which will increase month by month, if not day by day, and exemplify the scriptural truth, "Unto him that hath shall be given."

The question of exercise is important. It must at all times be kept strictly within the limits of fatigue; for fatigue invariably intensifies the symptoms, whatever that limit may be. The amount to be taken must be determined in each separate case, and it must not be forgotten that it has a high therapeutic value, as a derivative in local congestions, such as occur in mental overwork; and in hyper-excitability of the sexual organs it can scarcely be esteemed too highly. Within due limits it tends, in all cases, to increase the bodily vigor by exciting the appetite and by quickening and perfecting the digestive processes. Walking, riding, rowing, and gymnastic exercises are all useful, and each has its special indication. In genital and pelvic derangements, rowing and the use of light dumb-bells or clubs are to be preferred to walking, which attracts blood to the lower extremities. On the other hand, the exercise of the muscles of the arms, back, and chest diverts the blood from the pelvis. Riding is specially useful to those who have led sedentary lives, and whose biliary and digestive organs are impaired; the invigoration in many cases being rapid and appreciable. For those who have sufficient strength, a walking tour, or shooting, or fishing often proves beneficial. Exercise properly regulated is, for the reasons already mentioned, an exceedingly valuable means of promoting sleep, and particularly if it is taken in the open air.

The food will demand careful attention, for the aim must be to increase as speedily as possible the quantity and the quality of the blood, as well as the store of fat, so essential for the nourishment of the nervous system. It is consequently necessary to feed up to the extreme limit of the digestive powers. Unfortunately, these are in most cases impaired, and in almost all they are easily overtaxed and deranged. This latter must be carefully avoided, for much time may be consumed in restoring the impaired function.

When the digestive powers will bear it, two substantial meals should be taken daily; the first about one o'clock, the second about seven P.M., each consisting of clear soup, meat (such as beef, mutton, poultry, venison, or game), and milk puddings or stewed fruit with cream; varied every alternate day by fish being substituted for soup. The fish should be, preferably, raw oysters, whiting, sole, haddock, turbot, or brill. Green vegetables boiled in a plentiful supply of water should be eaten freely, also salads and tomatoes; potatoes more sparingly. Besides these, there should be at least two other meals; a substantial breakfast of Scotch porridge and cream, followed by chocolate or cocoa (made from the nibs), with toasted bread (preferably brown) and butter, fat bacon, and lightly boiled eggs. In the afternoon, in lieu of tea, a tumblerful of peptonized milk or koumiss. Each individual diathesis must be considered, and the diet varied to suit each separate case. Occasionally, much good accrues from the use of peptic and pancreatic liquors, and malt extracts taken at suitable times; or lactopeptine and ingluvin may be tried.

When the digestion is weak, it may be desirable to limit the amount of butcher meat. In constipation, it may be necessary to avoid milk and eggs. If there is great prostration, small meals every two or three hours must be resorted to, beginning in the morning at seven with boiled milk, sugar, and a spoonful of rum or brandy, following it up with the most easily assimilated food possible, such as raw-meat juice, clear soups, custards, peptonized food, koumiss, or Lœflund's Cremor hordeatus. In these cases it is necessary to give support when they awaken during the night.

Stimulant.—While many cases are best treated without stimulant, others derive benefit from its moderate use. The quantity prescribed must be limited to that which increases

the power and tone of the heart and blood-vessels, augments the appetite, promotes digestion and nutrition, and is not followed by marked depression. This quantity varies greatly in different persons, and can only be estimated in each individual case by careful observation and consideration. Its limit will probably be found, in all, not to exceed, of whiskey or brandy, one or two wineglassfuls; of port or sherry, two wineglassfuls; of burgundy, claret, hock, or champagne, one pint; or of Burton ale or porter one quart, in twenty-four hours.

In many cases a much less quantity will suffice, for if the physiological amount is exceeded it retards recovery. In some, when there is a congested condition of the brain, its use must be avoided. The choice of the stimulant may be left to some extent to the patient, but it is well to recollect that whiskey and brandy retard digestion less than sherry and port (Sir William Roberts), and that they owe their efficacy to the alcohol they contain; while wine contains ether; and beer, hops. All stimulants should be ordered to be taken with meals, and when they are required as a night-cap at bedtime for the purpose of promoting sleep, it is always advisable to associate them with a light repast. For example, a cupful of arrowroot with some brandy or whiskey with sugar; a whipped egg with brandy and sugar, and this is improved by a teaspoonful of chloric ether; white-wine whey and a biscuit; caudle, made of gruel and wine with nutmeg and sugar; mulled port, claret, or porter; warm spiced ale; brandy or whiskey toddy, with or without nutmeg, taken with a biscuit, are each and all suitable in selected cases.

When it is desirable to avoid ordering stimulant in such convenient forms, the mistura spiritus vini gallici of the Pharmacopœia flavored with chloric ether can be obtained from the chemist.

Prescribing stimulant is always a matter of grave responsibility in these cases. Flushing, as it speedily does, the brain with blood, and lessening almost instantaneously depression and gloom, the temptation to resort to its frequent use becomes great. This is particularly true in cases where the centres of volition are enfeebled; and in the cases of neurotics, who acquire habits with great facility, it is far from being devoid of risk. A medical prescription to take a certain quantity of alcohol at stated times has often been exceeded during an

illness, and continued after recovery, until it has resulted in chronic alcoholism; medicines and regimen have been dispensed with, but the leave to take stimulant retained, leading to moral, mental, and physical disaster. Such an event must be guarded against with the utmost care.

Many neurasthenics who waken in the early morning and lie or wander about miserable and depressed, are soothed, comforted, and enabled to sleep by taking a cupful of warm beef tea, or milk with a spoonful of brandy or whiskey; just as many a worn-out phthisical patient is strengthened on awaking by a cupful of warm milk with some sugar and a spoonful of rum.

The clothing should be light and warm; light, because these patients fret under the burden of heavy clothes; and warm, for the reason that they are susceptible to the influence of cold and draughts.

Baths judiciously employed are often of great service. The morning bath should be tepid, or if cold the patient should stand with his feet in hot water and carry out his ablutions quickly. The Turkish and sitz baths may be employed in the slighter cases; also the needle or shower baths. The wet pack at night is a powerful hypnotic, and it is generally well borne. Sea-bathing is particularly invigorating, especially when the patient can swim. Sea-air, abundant as it is in ozone, has a highly tonic effect upon the system; to dwellers in offices deficient in oxygen, or in other unhealthy surroundings, it is invaluable. Unfortunately, however, as it was pointed out in the first chapter, neurotics often fail to sleep well at the seaside, and when this is the case sea-bathing is of course contra-indicated. When it does not *per se* cause sleeplessness it is an aid not to be neglected, the selection of the watering-place depending a good deal upon the strength and temperament of the patient. In this country there is no lack of seaside health resorts to meet almost every description of case; while abroad their name is legion.

Dry and bracing climates suit neurasthenics best, the exception being that just referred to, where there is a tendency to excitement, in which case a sedative climate must be recommended. A prolonged stay in a hilly country is invariably productive of good results, and when disappointment has been experienced it has probably been due to the fact of the

residence not being sufficiently prolonged. In this country we have many excellent climates. Among them, there are the Sussex Downs, Malvern, Leamington, Falmouth, and the Yorkshire dales. The highlands of Scotland offer many advantages. Mountain air has been compared to drinking champagne without the bad effects. Abroad, there are many desirable resorts. The writer has seen most good accrue from residences in Switzerland, Egypt, and the Cape. In selecting a residence the capabilities of the place must be considered—its amusements, social life, historical, geological, or botanical attractions—with reference to the tastes of the patient, for unless reasonable entertainment can be had, he grows weary, restless, and irritable, and fails to derive benefit from the change. He must have mental occupation, and the varieties to be found in a neighborhood are important factors with regard to its selection.

It is very desirable that the patient should be able to live in the open air, and that he should have plenty of sunshine. Ladies who have broken down under the strain of nursing and anxiety often recruit during long sea-voyages, where they can enjoy quiet rest away from all depressing cares. These patients, however, must not undertake such expeditions if they are very debilitated, as stormy weather and unsuitable food may aggravate their state.

Business men likewise derive benefit from long cruises, as, out of reach of telegrams and letters, freed from the knowledge—ever recurring—of stock-exchange fluctuations and market prices, their nervous systems obtain the rest they so urgently require. In a certain number of cases in which extreme emaciation and prostration are the prominent symptoms, chiefly met with among neurotic women—occasionally the subjects of uterine ailments—the treatment suggested by Dr. Weir-Mitchell appears to be exceptionally valuable. It consists in removing the patient from her surroundings and sympathizing friends, in isolating her for several weeks, keeping her in bed, and filling up the day with massage, electrization, and large feeding. Further details upon this question must be obtained from the many special works on the subject.

Electricity is an admirable remedy in many cases of neurasthenia, whether it be used in the form of central galvanization or general faradization. Its effects are felt by the whole

economy; the mental depression becomes lessened and is replaced by hopefulness; the aspect of the patient becomes brighter, and the carriage and bearing firmer and more elastic; the walking powers improve, the limbs being more under control; pains in the spine and muscles grow less and vanish; the appetite is increased, and dyspeptic derangements disappear; the bowels begin to act naturally; improved nutrition manifests itself in increased body weight; and in the majority of cases insomnia either disappears or is greatly amended. The writer in advising galvanization directs that on alternate days very weak currents should be passed from the positive pole placed upon the forehead to the negative on the upper part of the spine; then from the positive pole pressed close into the angle of the jaw to the negative on the seventh cervical vertebra; afterward, stronger currents, from the positive pole situated over the cervical vertebræ to the negative in the epigastrium; and lastly, to the negative placed in a foot-bath. He relies upon weak and prolonged currents, lasting from twenty to sixty minutes, rather than upon strong currents; and in all cases he insists on the necessity of avoiding any interruption of the current. Every now and again this useful means of treatment fails to improve sleep, and appears to aggravate the other symptoms; it is therefore necessary to watch its effects. Improvement of sleep is always the precursor of other benefits.

The question of medication naturally arises here. The remedies must be selected from among the nervine and hæmatic tonics, but their administration should in every case be preceded by the correction of any stomachic and biliary derangements. It must be admitted that while some patients derive considerable benefit from tonics, there is a minority who are not improved by their use. When there is any cerebral congestion they are best avoided altogether. Among the multitude of tonics the following have been found reliable in many cases, particularly in those with relaxed arterial tension:

℞ Phosphid. zinc., ... gr. $\frac{1}{10}$ vel gr. ss.
Ferri. redact., ... gr. iij.
Ext. calumb., ... q. s.
Ft. pil. i. Sig. Take one after meals thrice daily.

℞ Ferri arseniat., ... gr. $\frac{1}{10}$ vel gr. ss.
Mastich., ... gr. ij.
Ft. pil. i. Sig. Take one after meals thrice daily.

Or,

℞ Sulph. quinin., ... gr. i.
Ext. nucis vom., ... gr. ss.
Pulv. digital., ... gr. i.
Ext. gentian., ... q. s.
Ft. pil. i. Sig. Take one between meals thrice daily.

Ergotin may be added to either of these. In suitable cases cod-liver oil with sulphuric ether may be advantageously recommended.

The bowels are not infrequently constipated. This must be met by appropriate diet, by electricity, and abdominal compresses worn during the night. If medicines are required, warm and mild laxatives should be preferred, for all purgation increases nervous exhaustion. The following have been found useful:

℞ Aloin., ... gr. i.
Ext. bellad., ... gr. ⅓.
Ext. hyoscy., ... gr. iij.
Ft. pil. i. Sig. Take at bedtime.

Or;

℞ Pil. coloc. co. vel pil. rhei. co., . . . gr. iiss.
Ext. lupul., ... gr. ij.
Ft. pil. i. Sig. Take one at bedtime.

In many cases, the treatment of neurasthenia upon the foregoing lines is all that is required for the accompanying insomnia, but in others this symptom requires special attention. It is important to unravel the cause upon which it depends in the particular case; for it follows from the causation of neurasthenia being most diverse, that the insomnia must depend upon equally varied conditions.

The sleeplessness which occurs in neurasthenic conditions induced by excessive brain work, shock, or depressing mental emotions, by the indiscreet use of tea and tobacco, or by malaria, syphilis, rheumatism, or gout, is discussed under these various heads.

When cerebral anæmia is present, it is important to decide the state of the blood-tension, for although it is usually "low" in anæmic conditions, it is not invariably so, and sometimes treatment directed to this point is attended by eminently satisfactory results. The estimation of blood-pressure is always a valuable guide in deciding the treatment of insomnia, not specially in neurasthenia, but in all cases. If the tension be "high," a few minute doses of calomel at night, with alkalies during the day, are indicated.

℞ Subchlor. hydrarg., . . . gr. ss. vel gr. i.
Ext. hyoscy., ... gr. ij. vel gr. iv.
Ft. pil. i. Sig. Take one every night for four nights.

℞ Bicarb. potass., ... ʒ iij.
Tinct. aconit., B. P., ... ♏ xx.
Aquam, ... ad ℥ vi.
M. Sig. Take a tablespoonful, in water, before meals thrice daily.

Instead of this mixture, two grains of sodium nitrite may be given thrice daily between meals. Dry cupping in selected cases is occasionally serviceable.

When the insomnia is due to such enervating causes as excessive discharges, excesses, prolonged bodily fatigue (sleeplessness dependent on physical over-fatigue is best relieved by the wet pack, or a warm bath, with some liquid nourishment. A suitable repast is a cupful of meat juice, containing a few spoonfuls of wine or brandy, with a biscuit. The addition of ʒ ss. of tincture of arnica is an improvement. A heavy meal eaten when one is over-fatigued will not digest, and the derangement it initiates increases the sleep disturbance. In certain country districts of England there is a firmly-rooted belief that primrose [primula] wine relieves the feeling of exhaustion, and promotes sleep. The writer has never been able to assure himself whether its good effects are attributable to the brandy it contains, the mental impression its administration insures, or to the constituents of the flowers. It is beyond doubt that it is occasionally efficacious. It is further worth noting that the belief has lived through centuries, and that even now many persons grow primroses specially for the purpose of manufacturing the wine), or over-excitement, mas-

sage before bedtime tends to promote sleep; speedily in a few, more tardily in the majority of instances. It practically consists of cutaneous rubbings, muscle kneadings, and joint movements. It increases the activity of the circulation and lymph-flow through the skin and muscles, and stimulates all the processes of the economy. It likewise raises the temperature of the cutaneous surface, and attracts to the integument and muscles an increased quantity of blood, depleting to a corresponding extent the blood-vessels of the brain—a condition favorable to sleep.

There are many remedies that in individual cases offer advantages, *e.g.*, chloric ether is an excellent stimulant, which conduces to sleep by allaying excitement in the nervous centres, either given alone, or as an adjunct, to increase the diffusibility of more potent remedies. Along with sumbul it acts as a cerebro-spinal sedative, calming excitement, subduing restlessness, and thus bringing about conditions essential to sleep. Hop, containing the active principle lupulin, has long been credited with hypnotic properties, and it is partly owing to this that malt liquors act as hypnotics; it is a stomachic tonic and cerebral sedative which allays excitement and promotes sleep. A very old and favorite prescription combining these three remedies is:

℞ Spt. chloroform., ... ℥ ss.
Tinct. sumbul., ... ℥ ss.
Tinct. lupul., ... ℥ i.

M. Sig. Take two teaspoonfuls in water every hour or two until sleep is procured.

A very similar and valuable remedy is:

℞ Tinct. digital., ... ♏ xx.
Tinct. sumbul., ... ʒ i.
Tinct. lupul., ... ʒ ij.
Aquam, ... ad ℥ ij.

M. Sig. Take one-half at bedtime, in water, and repeat in two hours if required.

Lupulin may be given in pill an hour before bedtime, in doses of two to five grains, and it may be repeated if necessary. The bromides and bromidia are frequently of considerable service when there is not pronounced anæmia, but

their use should not be persevered in for more than six nights. Monobromide of camphor, cannabis indica, tannate of cannabin, hyoscyamus, are each and all useful in various cases.

The writer has obtained very satisfactory results from the new hypnotic sulphonal, in doses varying from gr. xx. to gr. xl. In obstinate cases chloral hydrate may be given, but never for more than a few nights. Morphine may also be required occasionally, but its use should likewise be restricted. It is best given hypodermically with atropine, *e.g.* from $\frac{1}{10}$ to $\frac{1}{2}$ of a grain of morphine, with $\frac{1}{100}$ of a grain of atropine; or it may be combined with bromide and chloral hydrate.

℞	Liq. morphin. acet., ...	♏ xl. vel ʒ i.
	Hydrat. chloral, ...	gr. xl. vel ʒ i.
	Brom. sodii, ...	℈ ij.
	Syr. tolu., ...	ʒ iv.
	Aquam, ...	ad ℥ iv.

M. Sig. Take one-fourth part in water, before bedtime, and repeat in two hours if required.

CHAPTER V.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE NERVOUS SYSTEM—*Continued.*

HYSTERIA.

THE predisposing cause of this affection is a nervous system defective in stamina, and consequently unduly impressionable. Such nervous textures seem liable to have their functions perverted in a curious way by various exciting causes. These lead to a perversion rather than to a modification of function. The victims of this disease have a tendency to neurotic maladies, and their emotional centres dominate their volitional. It affects females above fifteen years of age, and most frequently at the epochs of puberty and the menopause. It is, however, not peculiar to the sex, as it affects males, though less frequently; being excited and developed by all conditions which exhaust the reserve store of nervous energy. It may be caused by violent and depressing emotions, disappointments, over-excitement, and prolonged anxiety; by lives so devoid of healthy mental and physical occupation as to engender introspection and self-consciousness; by all diseases and excesses which enfeeble the body; and reflexly, by uterine and ovarian derangements, which act prejudicially on the nervous system.

All such causes are unfavorable for sleep. It is therefore not surprising that this affection, in its many phases, is the source of disturbed sleep, and, at times, of persistent insomnia. In investigating this point, it is necessary to be careful not to allow the patient to think that sleep is an object of special interest, for so desirous are many of them to excite attention and sympathy, that they may develop sleeplessness as a marked feature.

The symptoms of hysteria are of the most varied nature; we can only indicate a few very briefly. As in the allied conditions of epilepsy and hypochondriasis, there is a paroxysmal

[illegible] in almost every case. There is a marked tendency to emotional excitement; to laugh, cry, and scream alternately, on the least provocation. The temper is perverse and uncertain, and the manic craving for sympathy referred to leads, in some instances, to crime, and even to disgusting practices. Sufferers from hysteria are prone to disturbance of the spinal cord, which renders them peculiarly sensitive to sounds and other external stimulations—one of the fruitful sources of insomnia; also to general hyperæsthesia, though at times the reverse condition of anæsthesia is met with; and even paralysis, the diagnosis of which is by no means easy. They may experience neuralgic pains in various parts of the body, prominent among which is spinal irritation, mastodynia, etc. They also suffer from convulsive attacks (hysterical fits), which differ from epileptic seizures in that they never come on during sleep, and are never attended by injury at the onset of the fit, or by biting of the tongue, etc.; though they may resemble epilepsy in being frequently followed by deep sleep. Between their paroxysmal attacks, hysterical patients frequently suffer from functional perturbations, respiratory and gastro-intestinal derangements, of which latter flatulence is a prominent symptom; and sometimes they pass enormous quantities of pale urine of low specific gravity, the result of high blood-tension. This condition of the blood-vessels accounts in some degree for the sleeplessness with which they are afflicted.

Treatment.—In no disease is it more essential to cultivate a good habit of sleep. It is especially necessary that the victims of hysteria should not spend too many hours in bed, and that they should rise immediately after awaking, as indolent dreaming in the morning tends to further enervation, and to aggravate the whole condition. Every endeavor must be made to obtain the confidence of the patient, not by sympathizing with her so much as by dominating her by judicious yet kindly counsel.

It is necessary to inspire her with the conviction that she can implicitly trust her adviser to make her well; to do this the proverbial "hand of iron in a glove of velvet" is required. The diet should be plain and non-stimulating, and taken at regular hours. All alcoholic drinks are, except in very exceptional cases, best avoided. Baths are invaluable: the

morning tepid bath, followed by brisk rubbing; the spinal douche, cold water poured down the spine while sitting in hot water; and, in suitable cases, the sitz bath. Exercise in the open air, particularly in the morning, short of fatigue, is of the first importance, and must be insisted on. The variety must depend largely upon the strength of the patient and the depth of the purse, and to some extent upon the tastes of the sufferer. Change of air and scene may be called for, as a means of securing healthy mental occupation. Every exertion must be made to engender self-control. Uterine, ovarian, and other derangements demand attention. Tonic remedies are usually prescribed. Probably the best are phosphorus, arsenic, quinine, strychnine, and the valerianates of zinc and ammonium. Electricity exceeds them all in value, while it is a useful aid to sleep. General faradization is the most efficacious. In many cases it is necessary to resort to special means to obtain sleep for a few nights. The calming influences of a hot foot bath, and douching the head with tepid water, deserve a trial. The late Dr. Graves, of Dublin, strongly recommended the use of musk in these patients. He quotes one case in which "all kinds of narcotics had been tried unsuccessfully, and opium, in all its forms, had failed in procuring sleep. I advised the use of musk in doses of a grain every second hour, and this means proved eminently successful." Musk, however, on account of its great cost, is now seldom employed. The ammoniated tincture of valerian with camphor is an excellent remedy, given once or twice before bedtime.

℞ Tinct. valerian. ammon., ... ʒ vi.
Spt. camphor., ... ʒ i.
Aq. chlorof., ... ℥ vi.

Sig. Take two tablespoonfuls every two hours until sleep is induced.

A mixture of hop, sumbul, and chloric ether also answers well, and it may be repeated (p. 597).

Paraldehyde, in doses ranging from ♏ xxx. to ♏ xlv. in syrup and water at bedtime is useful, all the more that its taste is unpleasant. Monobromide of camphor is efficacious, and amylene hydrate has been recommended.

The bromides, chloral hydrate, and even morphine by hy-

podermic injection may in some instances be called for, as it was in a recent case, which was complicated by anuria of several weeks' duration. In the last two cases under treatment, sulphonal acted most admirably, improvement quickly following its use.

Hypochondriasis.

Hypochondriasis is frequently accompanied by sleeplessness more or less pronounced; although it may not be urgently complained of, being overshadowed by the greater misery of morbid depression and painful sensations. In the cases in which want of sleep is a prominent symptom, its extent may be greatly exaggerated, for when the patient's attention is attracted to it he is liable to misinterpret both the quantity and quality of his sleep. In all such patients it is necessary to inquire carefully into the habit of sleep, that any disturbance may be remedied, aggravating as it does all the other symptoms; while sound sleep sufficiently prolonged tends to ameliorate them. Hypochondriasis is probably due, primarily, to functional disorder of the cerebral centres, which causes them to originate sensations, as of visceral or peripheral disturbance, which do not exist; and to be abnormally sensitive to impressions, not usually perceived, arising in distant parts. Cells so perverted in function, and so preternaturally perceptive, are productive of a distorted consciousness when awake, and are susceptible to the most trivial impressions arising during sleep; hence the disturbance of sleep.

In many cases the symptoms are limited to one system, and upon these the thoughts are concentrated until the sensations gradually deepen into pain, it may be of an agonizing kind, and although of central origin, most real to the sufferer. Frequently all the symptoms are referred to the sexual organs, the patient believing himself to be impotent or the victim of venereal disease; and in the female, they may be associated with severe pain in the vulva.

The morbid introspection and mental depression, which are out of all proportion to the ailments complained of, lead secondarily to enfeeblement of the mind, and enervation of the circulatory and respiratory systems and of the digestive and hepatic functions. Hence arise such symptoms as flush-

ings, vertigo, tinnitus, confusion, and weariness of thought, palpitation, arterial pulsations, sighing, sense of sinking at the epigastrium, disordered digestion, constipation, etc.

Hypochondriacs fall asleep when they go to bed, but they very frequently awake between three and five in the morning (when the circulation is most depressed) in a state of perspiration, and lie in abject misery, tortured with dreadful forebodings till the hour for rising.

It is of course necessary to search for organic disease, for a man may be hypochondriacal when he is really ill, as well as when he is not. Certain ailments also, such as varicocele, and various diseases of the rectum, are not infrequent sources of this affection, and the successful treament of these ailments goes a long way to bring about a cure. Many cases of hypochondriasis drift into insanity, especially if there be any hereditary tendency to mental disorder.

Treatment.—The causes must be traced out, and the patient's life arranged upon a physiological basis. If the conditions under which he has been living are inimical to health they must be altered.

The excessive use of tobacco, alcohol, and tea should be interdicted. Exhausting and debilitating practices must be abandoned, and in women, uterine and menstrual disorders rectified; although this must not be undertaken rashly, as many improve more quickly and permanently by treating the general health, and distracting the patient's attention from her local conditions. In some of these cases the treatment is begun at the wrong end.

When there is any tendency to neurotic disease, or if there be a gouty or rheumatic diathesis, or a history of syphilis, these morbid states afford indications for treatment.

The state of the blood-pressure is important. It is said that those who have "low tension" make bad recoveries, if they recover at all; while those who have well-marked tension in their vessels get better comparatively easily.

Here, as in the case of hysteria, it is most desirable to acquire the patient's confidence, so as to inspire him with hope, and thus secure that he will follow implicitly the counsel given him. He must be encouraged to cultivate the solace of healthy work, that his preoccupied mind may be diverted into healthier channels, and new psychical centres called into operation, to

the relief of those under whose dominion he has been living. Idleness adds greatly to his wretchedness. The influence of new mental conditions is well seen in the beneficial results that sometimes accrue from marriage. Some years ago a professional man, the victim of lithiasis, consulted the writer, believing he had an aortic aneurism. So convinced was he of it that he gave up his business, relinquished his literary work, and was far more unhappy and distressed than if he really had had an aneurism. After some years, falling in love with a lady who visited his house, he began to get better, married, and is now in robust health, a happy and busy man both in and out of his profession. There is a fair sample of the result of mental distraction, though the high arterial tension in this case was a factor in its favor. New interests are to be sought in change of air and scene, conditions calling into play new psychical centres, at the same time invigorating the whole nervous system. Residence in a bracing but not too exciting climate is to be advised, or at one of the many spas, either at home or abroad, where amusements and social advantages can be readily obtained; but wherever hypochondriacs are sent they should be accompanied by a judicious and cheerful companion. Exercise in the open air is always beneficial in these cases, and there is not, as in neurasthenia, much to be feared from over-exertion. The upper limbs should be employed equally with the lower by means of dumb-bells, clubs, or gymnastic exercises, so that at night the body will be all proportionately tired.

Hypochondriacs must be well fed, and that although the tongue is furred and digestion impaired; these conditions improve with good feeding. Extract of malt and cod-liver oil may be given. Stimulant, except in every expectional cases, is unsuitable, and had better be avoided. Bathing in the sea, cold sitz baths, cold foot baths, Turkish baths, or spinal douches, may be ordered in suitable cases.

General tonics, as arsenic, quinine, etc., may be tried, and the bowels regulated with compound galbanum pills, U.S.P., or compound asafœtida pills. Purgatives appear to cause increased sleep disturbance in some cases by giving rise to sensations in the alimentary tract which are perceived by the hyper-sensitive cerebral cells. The addition of ♏ ij. or ♏ iij. of the oil of chamomile flowers prevents this occurrence. In

such cases it is a most satisfactory hypnotic. It lowers reflex excitability in a very marked manner. The fresh oil, which has a greenish-blue tint, is to be selected. In the rheumatic, the tincture of cimicifuga in ʒ ss. doses three times a day is of value, and often improves sleep. Electricity, particularly central galvanization of the sympathetic, is worthy of a trial.

Sleep is of the first importance. Without it there can be no improvement, no brain recuperation, no increased innervation of the heart, etc., and no relief from the morbid depression. A light supper at bedtime, and some warm milk or beef-tea during the night or toward morning, are useful. Modified massage before going to bed, or a mustard plaster over the abdomen or alone the spine is sometimes serviceable. A hot bath before bedtime may be tried. In certain cases it answers admirably; though its effects are somewhat uncertain, and in some instances it intensifies the wakefulness.

When the blood-tension is low digitalis and ergotin should be given.

℞	Ergotin., ...	gr. i.
	Ext. nucis vom., ...	gr. ss.
	Pulv. digital., ...	gr. i.

Ft. pil. i. Sig. Take one thrice daily.

Or else, the citrate of caffeine in doses from gr. i. to gr. iv., thrice daily. It acts powerfully upon the vaso-motor system, but in large doses it causes headache.

When the blood-tension is abnormally high, calomel and alkalies with aconite suit well. (*Vide* page 596.)

When there is cerebral anæmia the chloride of gold and sodium in doses of gr. $\frac{1}{30}$ to gr. $\frac{1}{10}$ three times a day may prove beneficial. In hypochondriasis in the aged, arsenic should be prescribed in one or other of its varied forms. Cannabis indica lessens depression and promotes sleep; from gr. ss. to gr. i. may be given thrice daily, the last dose at bedtime. When some decided hypnotic is urgently required for a few nights, paraldehyde, chloral hydrate, with potassium bromide, or morphine with atropine may be used; but as those medicines all tend to retard recovery, by interfering with digestion, they must if possible be avoided. A well-shaded lamp in the bedroom is sometimes a source of much comfort, and in so far tends to promote sleep.

It is, however, on the whole, probable that perseveringly tiring the mental and bodily powers day by day, under healthy and bracing conditions, is by far the best hypnotic.

Insanity.

It is not within the scope of this work to deal with the great subject of insomnia connected with insanity; nor is the writer competent to undertake such a task, if he would, his experience being limited to the preliminary insomnia which preludes almost every form of insanity. This, of necessity, comes under the care of the general physician in the earliest stages, and at a time when the want of sleep may be the sole indication that there is any departure from perfect health. The following remarks will be restricted chiefly to the sleeplessness which occurs at the onset of mania and melancholia, characterized, as these conditions are, by exaltation and depression of feeling respectively.

Drs. Bucknill and Tuke, in their work on Psychological Medicine, make the following remarks: "Want of refreshing sleep we believe to be the frequent origin of insanity, dependent upon moral causes. Very often, when strong emotion tends to the production of insanity, it causes, in the first instance, complete loss of sleep. In many cases, however, the power of sleeping is not lost, but the quality, so to say, of the function is perverted, the sleep being so distracted by agonizing dreams that the patient awakens jaded rather than refreshed. We have known several instances in which patients, becoming convalescent from attacks of acute mania, have distinctly and positively referred to frightful dreams as the cause of their malady; and it is probable that a certain quality of sleep, in which dreams excite terror and other depressing emotions more forcibly than waking events are likely to do, is scarcely less adverse than complete insomnia to the nutritive regeneration of that portion of the brain on whose action those emotions depend. In such a condition it is highly probable that the very portions of the brain which most need a state of rest are, even during the sleeping quiescence of other portions, more wastefully engaged in the activity of their functions than they could be in the waking state. The mainspring of insanity is emotion of all kinds. This, stimulated by

phantasy, and emancipated from the control of judgment, during harassed sleep, may be more profoundly moved than at any other time."

Thus insomnia alone may lead to insanity.

It will be useful to glance at a classification of insanity. The late Dr. Skae, of the Royal Edinburgh Asylum for the Insane, stated it thus: "Intellectual and moral idiocy and imbecility. Insanity with epilepsy. Insanity of masturbation and pubescence. Hysterical, amenorrhœal, post-connubial, and puerperal insanity. Insanity of lactation and pregnancy. Climacteric, ovarian, hypochondrical, senile, phthisical, metastatic, and traumatic insanity. Rheumatic, podagrous, and syphilis insanity. Delirium tremens. Insanity of alcoholism. Malarious, pellagrous, and post-febrile insanity. Insanity of oxaluria. Anæmic and choreic insanity. General paralysis with insanity. Hereditary insanity of adolescence. Sthenic and asthenic idiopathic insanity." This classification, for all practical purposes, may be considered as a list of diseases and conditions predisposing to insanity. Among the exciting causes may be enumerated conditions we have already discussed, such as overwork, shock, worry, grief, and many debilitating diseases and practices referred to under the head of neurasthenia; states productive of cerebral exhaustion, which, in many instances, is accelerated by an increased blood-supply, maintaining activity in the already enervated centres.

The predisposing and exciting causes of insanity are worthy of study, for they embrace a vast number of diseases and conditions which occasion insomnia, and that without insanity supervening. The explanation of this is to be found in the stamina of the nervous textures. Circulatory modifications and defective nutritive changes in the brain may in those with stable nervous centres cause merely insomnia; and in others with unstable nervous tissues, pathological changes which end in insanity. It is important never to overlook the fact that insomnia, occurring in connection with any of these abnormal states, may be in reality the premonitory symptom of insanity. The early recognition of this truth not infrequently enables the physician to successfully avert its development.

Insomnia occurring without apparent cause, particularly in those who have an hereditary tendency to insanity, and whose general health is deteriorated, must ever be regarded

with suspicion, as a prodroma of mental disease. It demands the same vigilant and careful treatment that it would receive if the diagnosis were more definite, for pronounced mental diseases may develop suddenly, and be accompanied by suicidal and homicidal tendencies. Indeed many tragedies have been enacted in instances where the sole exciting cause, and the only precursory symptom, was insomnolency.

Dreams are common precursors of insanity, and at times (depending upon activity smaller in degree) they anticipate insomnia. The recurrence of a peculiar and unusual dream night after night, particularly if it is of a terrifying kind, should always arouse suspicion.

When consulted by a well-known patient for insomnia, at the commencement of an attack of mental disease, important assistance can be obtained in forming a diagnosis, by considering the family history, sex, age, station, and occupation, as well as the altered aspect and bearing almost certain to be present, and the perversion of feeling often displayed. A little tact will elicit a confession of some delusion, illusion, or hallucination which occurs during waking moments, and which the patient strives cunningly to conceal.

It is more difficult when the patient is unknown, for the change in appearance, manner, and demeanor may be so slight as to elude detection; in which case, some reliance must be placed upon the statements of relatives and friends. This is specially desirable when their evidence points in the direction of altered habits and disposition referable to the emotional rather than to the intellectual centres.

Mania may be ushered in by sleeplessness, and by a condition of depression which gives way to exaltation. It is usually accompanied by a certain amount of cerebral hyperæmia, which causes headache, flushing of the face, suffusion of the eyes, a raised temperature, and throbbing of the arterial vessels. It is not suggested that cerebral hyperæmia is the cause of the mania, but it is probable that it is an important factor in the production of sleeplessness; as well as being unfavorable for brain nutrition, which of itself tends to increase the abnormal condition of the brain. Hyperæmia, when associated with exhaustion in the emotional and volitional centres, renders them extremely irritable and excitable, and causes them to discharge their energy upon the slightest provoca-

tion and to dominate over the higher or intellectual centres; hence the extravagant behavior and boisterous conduct of maniacs. Sleep may be absent for days and nights, and the lack of it hastens the development of pronounced symptoms. Occasionally the patient tries to keep awake in consequence of terrifying dreams. No improvement can take place without sleep, and any favorable change is preceded by it.

Treatment.—Complete abstention from business must be insisted upon, and all sources of excitement removed, so that mental rest, so far as that is possible, may be secured.

The bowels must be thoroughly unloaded by a brisk purgative; the following is a valuable formula for a robust man:

℞ Res. scammon., ... gr. v.
Subchlor. hydrarg., ... gr. v.
Pulv. jalap., ... gr. v.
Supertart. potass., ... gr. v.

Ft. pulv. i. Sig. Take at once.

It usually acts well, but if it fails to do so it may be followed in six hours by some sodium sulphate. The application of a few leeches to the temples or behind the ears is to be recommended; as also an ice cap, or the use of cold evaporating lotions. When it is possible, the patient may spend a considerable portion of the day in the open air, walking or driving with a suitable companion, exercise and fresh air being useful adjuncts to treatment. Cases which are not pronounced, or which have begun to recover, are sometimes benefited by change of air and scene under judicious guidance and supervision. The resort selected must have a sedative climate, and be quiet. Stimulating seaside residences and places where gayety prevails should be eschewed.

The food must be generous, the meals large and frequent; a foul state of the tongue is no contra-indication to this. Malt extract or pepsin to aid digestion, with sound ale or stout, sometimes afford good results.

Baths are of special service when the patient can be induced to take them quietly. The hot bath prolonged for some time before going to bed, with cold applications to the head, is usually sleep-inducing. Dr. Newington has got good results from hot mustard baths. These full baths, however, should never be administered except in the presence of the

medical attendant. The wet pack may be employed if the full bath cannot be conveniently used. Hot foot baths—plain or with mustard—are excellent derivatives. Besides these applications it is highly desirable to insure sleep by the use of hypnotics; no time must be lost, treatment to be efficient must be prompt and decidedly energetic. Chloral hydrate is very suitable in such cases; its action is promoted by lithium bromide.

℞ Chloral hydrat., . . . gr. xl. vel gr. lx.
Lithii brom., ... ℈ij.
Syr. tolu., ... ʒij.
Aquam, ... ad ℥ij.

M. Sig. Take one-half an hour before bedtime, and the other half in an hour afterward.

Hydrobromate of hyoscine is highly praised; it is said to rapidly induce sleep of sveral hours' duration without any bad effects, even in the midst of great excitement. It is best administered hypodermically in doses ranging from $\frac{1}{200}$ of a grain to $\frac{1}{100}$ of a grain. Urethane and paraldehyde are reliable remedies. Occasionally morphine is called for; it should be given in doses of from $\frac{1}{4}$ to $\frac{1}{2}$ of a grain in combination with $\frac{1}{6}$ of a grain of tartar emetic. If with the return of sleep the mental condition does not speedily improve, the patient should be sent to a retreat, for improvement takes place more quickly if sent early, and it is difficult to secure proper conditions for treatment at home. Active treatment will render removal unnecessary in many cases, but it must not be carried on too long.

Melancholia.—It is often difficult, at first, to distinguish between depression of spirits, hypochondriasis, and melancholia, so very imperceptibly do these conditions glide from one into the other; each being characterized by mental depression and by an enfeebled state of the bodily health.

Melancholia, however, is always attended by some cerebral change, probably depending in most cases on cerebral exhaustion, and accompanied by a certain amount of anæmia. It differs in one essential respect from hypochondriasis, in that the victims are usually apathetic about what happens to them, though they are extremely miserable; while hypochondriacs are tenacious of life, and appear never to weary

searching for health. Melancholics are not so sleepless as maniacs, yet the want of sleep is often an early and prominent symptom. They do not readily sleep, and if they do, they awake soon to be tormented by the vilest misery that it is possible for human creatures to endure. Well-directed treatment at its onset is often attended by good results; it is frequently efficacious in averting the necessity of removal to a retreat.

Treatment.—All that was written upon the subjects of mental rest, food, stimulant, exercise, change of air and scene, etc., when discussing the question of neurasthenia, might be re-written here. Probably a larger amount of stimulant is called for, generous wines being admissible, such as sound Burgundy and claret. In choosing a health resort, the more bracing are indicated. Turkish baths afford good results in overcoming the melancholy, and they promote sleep. Dr. Clouston speaks highly of them as a means of cure when the affection has developed. Mustard plasters over the stomach at night are to be advised; night feeding, *e.g.*, milk or beef-tea with a spoonful of rum once or twice during the night, promotes sleep.

Tonics of all kinds are called for, arsenic, quinine, strychnine, etc. In anæmic cases the syrup of the phosphates of quinine, strychnine, and iron, in ʒ i. doses thrice daily after meals, in water, is excellent. Malt extract and cod-liver oil after meals are useful. Furring of the tongue is no hindrance to increased feeding; on the contrary, rather an indication for it.

The bowels must be attended to; mild warm laxatives being preferred to salines.

For several nights at least sleep must be secured by hypnotics, the best being morphine with atropine, by hypodermic injection. Sulphonal and paraldehyde are both useful, as is chloral hydrate, and camphor with cannabis indica is a good combination.

℞ Camphor., ... gr. ij.
Ext. cannab. ind., ... gr. ss.
Ext. hyoscy., ... gr. iij.
Ft. pil. i. Sig. Take at bedtime.

In all cases suicide should be guarded against, and the treatment at home ought not to be persevered in too long.

MYXŒDEMA.

In the report of the Committee of the Clinical Society of London, nominated to investigate the subject of myxœdema, published in 1888, it is stated: "In a large proportion sleep is noted as good, but in many of these there is excessive somnolence, especially in the daytime. In about one-third of the cases wakefulness is recorded, and sleep is often disturbed by horrible dreams and sensations. It may be noted that drowsiness during the day is very common in myxœdema in both good and bad sleepers."

In a case the writer had under his care some years ago, insomnia was a prominent and troublesome symptom, and the sleep that was obtained was restless and disturbed by frightful dreams. He tried many remedies for its relief, but found none efficacious except morphine. His limited experience does not warrant him in saying more upon the subject.

CHAPTER VI.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE NERVOUS SYSTEM—*Continued.*

INSOMNIA DEPENDING UPON SPASMODIC NEUROSES.

CHOREA is a functional disorder of the motor centres of the brain, initiated by faulty nutrition arising in many diverse ways. It may be brought about by hyperæmic and anæmic conditions; modifications of arterial tension; toxic states of the blood, as in rheumatism; valvular diseases of the heart; pregnancy; strains, as in overwork; and shock, as in fright. It occurs most frequently in those whose nervous systems are susceptible to impressions; whose nutrition is materially deteriorated; and who have a hereditary tendency to neurotic disease. In about one-half of all the cases it is excited by fright, depressing emotions, and mental overwork; and these affect females and males in the proportion of three to one (p. 565).

Sleeplessness exists to a greater or less extent in all cases, and not relatively to the severity of the movements, although these manifestly influence it. On the other hand, the depth of the sleep exerts a powerful influence over the movements. When it is sound they usually entirely cease. In slight cases, sleep is uneasy and restless, though the movements are completely arrested. In more pronounced cases there is difficulty in getting off to sleep, and when sleep follows, it is broken and disturbed by alarming dreams which cause the patient to awake in terror; in the worst forms of the disease, sleep is sometimes impossible, and when death occurs it is mainly due to this complication. Choreic insanity is always heralded by insomnia.

Treatment.—The patient must be carefully guarded from all mental shock and strain; well nourished with simple and light food; encouraged to spend as much time as possible in

the open air, and to practise systematic gymnastic exercises. When the attack is at all pronounced, it is well to keep the sufferer in bed, as there he improves more quickly. Tonics, such as arsenic, strychnine, etc., are always indicated. Antipyrine, which has lately come into use in the treatment of this disease, appears to influence sleep favorably; the dose is from five to eight grains three times a day.

Warm baths, wet packs, or modified massage toward bedtime are each useful in promoting sleep.

Alcohol in the form of white-wine whey acts beneficially in almost every case, equalizing and tranquillizing the cerebral circulation, and often cutting short the disease.

When there is cerebral hyperæmia, mild purgatives are useful derivatives. To promote sleep, which is the most curative of all agents, monobromide of camphor may be given in two-grain doses at 4 and 8 P.M. The following also suits well in more severe cases:

℞	Chloral hydrat.,	ʒ i. vel ʒ iss.
	Potass. brom.,	ʒ ij.
	Syr. tolut.,	ʒ vi.
	Aquam,	ad ℥ vi.

M. Sig. Take a tablespoonful in water two hours before bedtime, and again at bedtime.

In anæmic conditions of the brain, alcohol must be freely pushed to a point short of intoxication, and from 5 to 10 minims of the solution of acetate of morphine given for several successive nights. All these remedies are suitable for children between eight and ten years of age.

The value of sleep in the treatment of severe chorea has lately been emphasized by Dr. Charlton Bastian, and Professor Gairdner, of Glasgow ("Lancet," 1889). It is of equal value in every form of the disease, and that it should be so is obvious from the fact that sleep is the time favorable for the recuperation of the nervous system.

Paralysis Agitans.—Sleeplessness may occur at the very beginning or in the premonitory stage of this disease, before tremor has been noticed at all. Slight weakness of the limb may be the only symptom, and that only after using it, perhaps discernible in the right hand alone, after writing. It may occur also in connection with neuralgic and so-called

rheumatic pains, which occasionally mark the onset of the illness.

When the disease has developed, sleeplessness may depend upon various abnormal sensations seldom absent, and which always distress the patient, *e.g.*, stiffness and rigidity of the muscles of the head and neck; stiffness and tension of various muscles of the trunk, rendering voluntary movements difficult. These are most noticeable and troublesome at night, for they prevent the patient changing his position in bed, and the constant desire to move about or to turn round, combined with the inability to accomplish it, induces an irritability well-nigh intolerable. Sensations of heat, chiefly referred to the back and epigastrium, are complained of, and perspirations which lead to tossing off the bedclothes.

Sleeplessness may likewise be due to the visceral disorders to which these patients are liable, owing to their inability to take exercise. During the earlier stages of the disease the trembling movements cease during sleep, but in the later stages the movements may interfere with sleep; while the declining bodily nutrition and the increasing nervous exhaustion invariably do so.

Mental influences aggravate tremor and increase sleeplessness, but the latter is due more to the fatigue following the severe paroxysms of shaking than to the mental perturbation. Almost every case of paralysis agitans that the writer has met with in practice, has occurred in persons who had always been bad sleepers. At present he has under his care such a case, a gentleman aged fifty-eight years, who has been afflicted with the complaint for eight or nine years, and whose most troublesome symptom is want of sleep. Throughout his life, though he has worked as hard as it was possible for any man to work, and has rendered signal service to his country in more than one department, he has not slept on an average more than four or five hours a night.

Treatment.—The food and stimulant must be carefully regulated, especially that taken at the last meal of the day; and all disorders of digestion and constipation remedied. Change of air and frequent change, suited to the temperament of the patient, does much to improve sleep. The patient's bed should be such that he may repose comfortably, and be able to change his position with as little difficulty as possible; an

iron or brass bedstead with an unyielding hair mattress suits best. It is always a comfort having some one sleeping in an adjoining room to assist the patient in turning if required.

If it is necessary to resort to special treatment for sleeplessness, galvanization, mustard over the epigastric region, modified massage, and hot foot-baths, are each useful. Hypnotics are occasionally required for four or five nights, for the purpose of forming a better sleeping-habit. Paraldehyde in full doses at bedtime is exceedingly useful. Also,

℞	Chloral hydrat.,	℈iiss.
	Potass. bromid.,	ʒi.
	Liq. morph. acet.,	ʒss.
	Syr. aurant.,	ʒi.
	Aquam,	ad ℥iij.

M. Sig. Take one-half at bedtime and the other in two hours if required.

Sulphonal in 20-grain doses, acted extremely well in one case. Occasionally remedies directed to the cure of the disease, by controlling tremor, improve the power of sleep, but this is not always so. In a recent case $\frac{1}{80}$ of a grain of hyoscyamine was prescribed twice daily; its physiological effects speedily and markedly manifested themselves—dilatation of the pupil, dryness of the mouth and throat, noises in the ears, confusion of thought, delusions, incoherent speech, and giddiness; but, although the tremor literally disappeared, the insomnia was aggravated.

Dr. Taylor, of Lower Tooting, kindly brought under the writer's notice a case of many years' duration, which was complicated with spasmodic wry-neck, where both affections yielded to the use of scutellaria continued perseveringly during nine months.

Spasmodic Wry-Neck.—When the spasmodic movements which accompany this affection do not cease during sleep, considerable relief may be obtained from a specially constructed pillow, assisting, as it does, to control the movements.

Insomnia from Paroxysmal Neuroses.

Epilepsy. — Many epileptics suffer from sleeplessness. Restlessness and disturbed sleep prelude the attacks equally with sound sleep.

Among the predisposing causes of epilepsy, the most frequent is a tendency to neurotic disease; while among the exciting causes are some which we have already considered as sources of insomnia. For example, Dr. Russell Reynolds found that in twenty-seven cases out of sixty-three the disease was excited by fright, grief, worry, and overwork; and Dr. Gowers found that fright caused 10 per cent of all the cases he investigated—under the age of ten years, in males and females in equal proportions, and between ten and twenty years in the proportion of three males to four females.

The pathology of epilepsy has not yet been definitely ascertained, but it is generally believed that in the initial stage of the seizure there is profound cerebral anæmia; for besides the marked pallor of the face, Dr. Hughlings Jackson found on ophthalmoscopic examination that the retinæ were bloodless. This accords with the convulsions which attend acute cerebral anæmia from sudden and profuse bleedings, but the exciting cause of this anæmia in epilepsy is still a mystery. It seems not unreasonable to argue that the conditions which give rise to it, and cause epilepsy, acting in a less degree may excite a modified cerebral anæmia sufficient to account for wakefulness.

Such cases of insomnia are easily enough recognized where there is a history of epilepsy, but if there is not, the cause may elude detection; for the seizures, the *petit mal* and the *haut mal,* may occur only during sleep, and their existence be unsuspected, the patient himself having no knowledge or recollection of the attacks. He usually complains of languor, pain in the back and in the muscles of the body generally, fulness and weight in the head in the morning, which requires for its removal more than one good night's sleep. Should his tongue be bitten, or petechial spots be found about his head, neck, or chest, or if he has passed his urine unconsciously in bed, and has been heard to utter a piercing cry, the diagnosis will be tolerably clear. A little care will suffice to trace the sleep disturbance to its true origin. If sound sleep does not follow the epileptic attack, the patient may become irascible, restless, and even violent during the day, and sleepless at night, and unless proper means are adopted, this may continue until a severe seizure ensues.

Treatment.—It is practically that of the disease. The rec-

ognition of the causation is the important point. The patient's life must be carefully considered and arranged, for, as the late Dr. Latham wrote: "That by knowing what a man is, and how he lives habitually, the physician often arrives at a much better judgment and a better treatment of his diseases." All debilitating practices must be interdicted, and the exciting causes, so far as possible, removed. Food should be nutritious, but bland and unstimulating; and alcohol, in most cases, should be dispensed with. Bathing, under suitable conditions, and well regulated exercise, are useful adjuncts to treatment. All mental strain should be avoided. It is said that patients are less liable to night seizures if they sleep with the head well raised upon a high pillow. Sleep in these cases is certainly improved by this, and one patient, who was for many years under treatment, seldom, if ever, had a fit during the night, except when his head got off the pillow, and on to the same level as his body. Sleeplessness is an indication for pushing energetically the medication of this affection.

Whenever altered sleep at night, or changed demeanor during the day, indicates an approaching fit, ʒ i. of potassium bromide, with 10 to 15 grains of chloral hydrate, may be given at night until the crisis appears to be passed. Dr. Russell Reynolds thinks belladonna valuable when there is disturbed sleep. In two cases the writer believed he obtained good results from the administration of nitrite of sodium in two-grain doses, thrice daily. A whiff of amyl nitrite improves sleep.

Migraine.—Sleeplessness is not infrequently met with in the victims of this distressing complaint. Much has been written concerning the pathology of migraine. The writer is disposed to accept Dr. Liveing's view, that it is practically a nerve storm, the condition arising from the irregular accumulation and erratic discharge of nerve energy bringing about anæmic and hyperæmic states of the brain. "A nerve-storm traversing more or less of the sensory tract from the optic thalami to the ganglia of the vagus, or else radiating in the same tract from a focus in the neighborhood of the quadrigeminal bodies." As it was argued in connection with epilepsy, so the theory may be advanced here, that these causes, acting in a less degree, may give rise, not to migraine, but to disturbed sleep. The predisposing and exciting causes of migraine are closely allied to those of insomnia. Among the

former are hereditary tendency, neurotic temperament, and adynamic states of the system; and among the latter, overwork, excitement, depressing emotions, excesses of all kinds, and curtailment of sleep. When the attacks are severe they prevent sleep.

Treatment.—Everything tending to promote good sleep and to establish the patient's health on the highest level between the attacks should be aimed at. The details of the daily life ought to be arranged so that the food, mental work, and corporeal exercise should bear relation the one to the other, and be in proportion to the strength. Turkish baths or the needle or spray baths are often suitable. Alcohol is best avoided by the majority; in the smaller number it must be carefully prescribed.

Cannabis indica, with valerianate of zinc, taken for a time, improves sleep and controls the attacks.

℞	Ext. cannab. ind., ...	gr. ss.
	Valerian. zinc., ...	gr. ij.
	Ext. gentian., ...	q. s.

Ft. pil. i. Sig. Take one pill twice or thrice daily.

When the attack threatens, ten grains of antipyrine may be given every thirty minutes for four doses; or two grains of the citrate of caffeine in a little aerated water, the patient lying quiet, in a darkened room, with a hot bottle to the feet, and a mustard and linseed poultice over the stomach. Dr. James Little advocates the addition of twenty grains of sodium salicylate to the citrate of caffeine, to be repeated in two hours if required. Should these remedies not improve sleep, paraldehyde or bromidia may be given at bedtime for a few nights. When the attack of migraine is so severe as to prevent sleep, $\frac{1}{6}$ of a grain of morphine tartrate with $\frac{1}{100}$ of a grain of atropine may be administered hypodermically; or if morphine is contra-indicated, from five to ten grains of butyl-chloral hydrate should be given in some syrup and water.

Nightmare.—In this disorder, as well as in night-terrors and somnambulism, there are unequal degrees of "particular sleep" (p. 502) in the cerebral centres, causing disturbance of "general" and, probably, of unusually sound sleep.

Nightmare is brought about by a vivid and alarming

dream, implying great activity in some of the psychical centres, while the motor centres are slumbering. The dream is usually of such a nature as to impress the sleeper with a most painful sense of immediate bodily danger, from which he should instantly extricate himself. Unable to move, his agitation and fright increase, until he wakes—perhaps in the act of groaning or shouting for help. When he is thoroughly roused he is quite free from all discomfort, and relieved to find his misery has been caused by a dream, although he may try not to fall asleep again, for fear of a recurrence.

The most frequent exciting cause of nightmare is disturbance in the gastro-intestinal canal, such as is caused by eating indigestible food, or by drinking a variety of wines at a late dinner shortly before retiring to bed. It is sometimes due to an exhausted or neurasthenic state of the nervous system, and it is liable to occur in persons of gouty habit.

Treatment.—The general health must be attended to, the diet regulated, the bowels unloaded, and the sleeping conditions improved, if they are in any way defective. Potassium bromide may be given for several nights in ʒ ss. to ʒ i. doses, to equalize and tranquillize the cerebral circulation.

Night-terrors.—Closely allied to nightmare, but differing from it in its pathology, is the condition known as night-terrors. It is commonly met with in children between the ages of one and four years who are the victims of dreams, which appear to affect the cerebral centres of emotion to a greater extent than the higher centres.

The pathognomonic symptom is that they wake within the first two hours of sleep, when it is deepest, in a state of great agitation, screaming violently, and evincing a strong desire to get away from something (as a wild animal), which they evidently think is attacking them; they beseech their father or mother to remove it, and fail to recognize the parent they are entreating, who may at the very time have the child in his arms. As the centres of consciousness awake the child realizes its happier surroundings, and becomes gradually pacified, although it always takes some time to restore its confidence, and admit of its falling asleep. This terror does not recur the same night, though it is liable to do so on which follow.

Ringer, in his "Handbook of Therapeutics," points out

that squinting sometimes occurs along with it, and that it may afterward become permanent.

The predisposing cause of this affection is an impressionable and excitable nervous system.

The exciting causes are teething, gastro-intestinal derangements, whooping cough, febrile disturbances, and improper sleeping conditions.

Treatment.—It is desirable to remove or relieve the exciting cause of the attacks, and to adopt measures for invigorating the nervous system. The food must be carefully arranged, so as to avoid over- as well as under-feeding. The sleeping room ought to be of a comfortable temperature, and thoroughly ventilated, and the bedclothes light and warm. A shaded light, and the presence of a nurse in the immediate vicinity, are great comforts to a nervous child in going to sleep, giving it confidence, and preventing its emotional from dominating over its other centres: they are therefore valuable prophylactics. Where digestive derangements are present mild laxatives are called for.

℞ Pulv. rhei, ... gr. ij.
Bicarb. sodii, ... gr. iij.
Pulv. aromat. co., ... gr. i.
Ft. pulv. Sig. Take one twice daily.

The bromides are very valuable in these cases, and Dr. Ringer says that they remove the squinting.

℞ Brom. potass., ... ʒ i.
Syr. aurant., ... ʒ iij.
Aquam, ... ad ℥ vi.
M. Sig. Give a tablespoonful at 4 P.M and at bedtime.

A warm bath should likewise be given at bedtime. If the attacks do not quickly subside, the little patient should be awakened two hours after falling asleep, so as to prevent sleep from becoming too profound.

Somnambulism.—In briefly alluding to this subject in the introductory chapter, it was pointed out that the state depended upon an unequal distribution of sleep, and that it involves certain areas, in varying degrees of depth. Somnambulism is virtually an acted dream.

It may take the form of sleep-crying, sleep-talking, sleep-

eating, or sleep-walking, for these conditions are closely allied to each other, and all necessitate correlated muscular movements. The following remarks have reference mainly to sleep-walking, in which the movements are as quickly and as unhesitatingly performed as if they were directed by consciousness, and not merely taking place solely under the dominion of the basal ganglia. They are sensori-motor acts; and they have been rightly described as "subhuman rather than superhuman." Somnambulists having conceived their dream, stage it so precisely that they are able to act it with admirable exactness. Their concentration renders them oblivious to all unconnected objects or disturbing agents, so that they perform as well in a dark as in a lighted room, and with their eyes closed as well as open. They are unconscious of sounds or noises not associated with their conception; they may be shaken, and may themselves cough and sneeze without being awakened. It is recorded that the food of which they were partaking has been changed, and that their snuff has been replaced by sawdust, without their apparently perceiving any difference. (Wood.)

Among the predisposing causes of somnambulism must be ranked hereditary tendency, which may long remain undeveloped, and yet appear under the influence of exciting causes. It is certainly met with in the gouty, and in those of neurotic temperament, and it is related in some degree to hysteria, epilepsy, and catalepsy. Most common in youth, it affects in almost equal proportion males and females. Dr. Anstie ("Lancet," 1873) wrote: "Of 23 somnambulists and 19 habitual sleep-talkers, belonging to 24 families, 12 somnambulists were males and 11 females, 13 sleep-talkers were males and 6 were females." It commonly disappears when adult age is attained; when it does not, females are more frequently affected than males. The worst of all cases are those occurring in males in middle age.

The exciting causes in children are mental excitement, overwork, fright, physical exhaustion, digestive disturbances, and an overloaded bladder.

In adults it arises from the same mental causes, derangements of the hepatic and digestive functions, and over-eating and over-drinking. In females it also arises from uterine and ovarian disorders, and menstrual irregularities.

It is said to arise from sleeping with the head low, and it must be added that it may occur in apparently healthy persons. Somnambulism may exist in various degrees; beginning as simple sleep-talking, it may increase till it ends in sleep-walking. At first the sleeper may merely rise from bed and walk round the room to perform some trifling act, and then return to bed; but, as the habit grows, he may successfully elude articles of furniture, unlock doors, open windows, walk out of doors, along dangerous roofs or beside the edge of precipices, and perform feats he could not possibly undertake during waking moments. Cases are recorded in which sleepers have swum across rivers, thrashed corn, ridden on horseback, and pursued their usual daily occupation.

The case of somnambulism which occurred among Dr. Guthrie Rankin's patients is worth recording. A young woman, worn out by much anxious nursing, lay down upon her bed with her clothes and slippers on, thoroughly exhausted. By-and-by she rose in her sleep, left the house, and proceeded to walk across the country through fields in which snow lay a foot deep, opening gates and climbing fences, evidently bent on reaching the house of a relative some miles distant. Being missed from her room, she was traced, and found walking, almost perished with cold, in a deep sleep. There appears to be a certain amount of anæsthesia associated with sleep-walking.

In a recent case the patient rose from his bed, and dreaming the house was on fire, opened the window, and threw himself out. The rapidity with which such incidents can take place is somewhat remarkable. Another patient who had lost part of a previous night's sleep, was left by his visitors in the drawing-room at 10 P.M., when he sat down to read by the aid of a lamp. He fell asleep, and slumbered until awakened by a noise, when he discovered that in walking about the room in a state of nudity he had knocked over a table. It was just 10:30 P.M. In half an hour he had read, fallen asleep, conceived his dream, undressed, folded his clothes most carefully, laid his socks over the top of his boots (anything but his usual custom), extinguished the lamp, and started on his peregrinations. So far as he is aware he has not repeated this experience, although fully twenty years have elapsed.

After the dream-act is concluded the actor returns to bed,

sleeps until his usual hour for rising in the morning, and when he awakes he either does not recollect anything of his escapade, or remembers it only as a dream. When the event is not remembered, it may recur to him in a subsequent somnambulistic state. If the sleep-walker is awakened incautiously, he is generally much agitated and frightened, and his movements become uncertain and clumsy. Sleep-walking leads the actors into situations which endanger life, and yearly many deaths are recorded from accidents so arising, and terminating fatally. Either they lack the dexterity with which they are popularly credited and seem to possess, or awaking at a critical moment, coolness and precision desert them, and lead them to ruin.

The subject is important from a medico-legal standpoint; indeed, from every point of view somnambulism is the source of much anxiety to the afflicted and to their relatives.

Treatment.—Should the victim be found in his wanderings, he ought not to be awakened, but led as gently as possible back to bed, abrupt awaking being apt to give rise to shock, which may mark the onset of other nervous diseases. The prophylactic treatment is important. The general health must be attended to, and all neurasthenic conditions remedied. The mind and the body should be daily exercised in something like relative proportion, undue fatigue or excitement of either being avoided. The food must be light and nutritious, late meals shunned, and alcoholic drinks avoided or moderately used, especially toward night. The bowels should be regularly evacuated. The sleeping room should be cool, the mattress firm, the clothes light, and the pillow well raised. Warm baths should be taken at night, and Turkish or cold sitz baths during the day are beneficial in most cases.

If in spite of these remedies the habit continues, it may be necessary to waken the sleeper between the first and second hours of sleep, when it is deepest, so as to prevent the sleep becoming too profound. Monobromide of camphor may be given in 4-grain doses at six P.M. and at bedtime. In some cases it is necessary to chain somnambulists by the leg to the foot of the bed, and in all to see that the doors and windows are securely fastened.

CHAPTER VII.

INSOMNIA DEPENDING UPONS AFFECTION OF THE NERVOUS SYSTEM—*Continued.*

FROM AFFECTIONS OF THE BRAIN AND ITS MEMBRANES.

IN Chapter II. we alluded briefly to the causation of active and passive cerebral congestion, and of cerebral anæmia. This must be taken along with the following remarks upon their symptoms and treatment.

Active cerebral congestion or *hyperæmia* exists in many degrees. When it is general and severe it may speedily pass into the more pronounced form of inflammation, in which the early symptoms of headache and insomnia are replaced by those of stupor and coma. It is only to the slighter cases that we wish to refer.

The symptom which prominently characterizes cerebral hyperæmia is sleeplessness, or sleep disturbed by dreams of a vivid and distressing kind. Tubercular meningitis is so frequently preceded by dreams of this latter description, that when they occur persistently in children they should be regarded with suspicion as precursors of that disease. Cerebral hyperæmia is usually accompanied by headache, flushed face, throbbing vessels, giddiness increased by stooping, an altered mental condition, irritability, restlessness, and defective memory; and in children by convulsions. The pupils are usually contracted, the vision is impaired, with flashes of light from the eyes, and motes floating before them; there are noises in the ears, and other abnormal sensations are felt, depending upon perversions in the sensory centres and nerves. The pulse is hard and frequent, although it is sometimes slow. The gastro-intestinal functions are deranged, and these derangements not infrequently aggravate the other symptoms. In the cases which depend upon overwork, such as have already been discussed, the aspect may be altered; it may be

pale and haggard, and differing very decidedly from the florid countenance just described, being suggestive of anæmia rather than of hyperæmia. In such cases the pulse must be used as a guide, for it is invariably hard and incompressible.

It may be here noted that the difficulties in diagnosis between anæmia and hyperæmia of the brain are much greater than might be supposed, for the reason that many of the symptoms which characterize the one may be said to characterize the other. These opposite conditions lead to mal-nutrition of the cerebral cells, and these cells display symptoms of their starvation, which are alike in both states. Reference will be made presently to the resemblance which exists between acute cerebral anæmia in children, and hydrocephalus. The ophthalmoscope and sphygmograph give little or no help in the diagnosis. It is only by carefully considering all the facts that a correct conclusion can be arrived at. Plethora in the one case and anæmia in the other may be leading features; though some of the cases of sleeplessness which occur in convalescence from severe disease, in reality owe their origin to hypostatic congestion due to the lying posture, rather than to the anæmia from which they are suffering, a fact not to be lost sight of in the treatment of these cases.

Treatment.—Whatever be the cause of the cerebral congestion, the treatment must, to a greater or less extent, be conducted upon antiphlogistic principles. The patient must rest in bed with a well-raised pillow to keep the head high, with light and warm bedclothes; in a darkened, quiet, cool, and well-ventilated room. The food should be fluid and non-stimulating. Moderate depletion, by leeches behind the ears, or by dry or wet cupping, is, in most cases, the best means for insuring speedy relief, and that, in the pale and haggard-looking patients we have just referred to. The trifling loss of blood is quickly made up, and the immediate effects are of the happiest kind; it may, however, require to be repeated upon two, three, or more occasions.

In the slighter cases the application of cold to the head, by means of ice-bags or Leiter's tubes, or evaporating lotions, is generally all that is required; particularly if it is used coincidently with derivatives, such as hot sponging to the spine; mustard over the lower limbs or epigastric region; or the mustard foot-bath.

Free purgation by means of calomel, jalap, and scammony is called for.

℞ Subchlor. hydrarg., ... gr. ij.
Res. scammon., ... gr. ij.
Pulv. jalap. co., ... ʒ i.
F. pulv. i. Sig. Take at bedtime.

The following may be prescribed at the same time:

℞ Iod. potass., ... ʒ i.
Bromid. potass., ... ʒ iv.
Tinct. aconit. (B. P.), . . . ♏ xxxvi.
Spt. ammon. arom., ... ʒ iij.
Aquam, ... ad ℥ vi.
M. Sig. Take a tablespoonful in water every four hours.

When the heart's action is not powerful, ʒ ij. of chloral hydrate may be substituted for the aconite. In very slight cases a saline, such as a teaspoonful of Carlsbad salts in half a teacupful of warm chamomile tea at bedtime, acts as an excellent hypnotic. It may be given also in the morning. In convalescence, electricity and the use of sitz baths are useful remedies.

When cerebral congestion arises in children as the result of teething, sleeplessness is a most troublesome symptom. The swollen and tense gums should be thoroughly incised; the head kept cool by means of cold applications; warm or tepid baths frequently repeated; and the bowels relieved by gentle laxatives. Bromide of potassium, monobromide of camphor, or chloral hydrate may be given every three or four hours.

Passive Congestion of the Brain.—The symptoms of this affection closely resemble those of the active variety; indeed, the most marked difference that exists is in the symptom under consideration. Wakefulness is not nearly such a prominent or constant feature as disturbed sleep, though that is keenly felt and badly borne. When the patient gets off to sleep he is disturbed by frightful dreams, from which he awakes in terror—probably a more distressing condition than lying awake. This is due to the anæmia with which it is invariably associated, for the blood in the veins is useless for the purposes of nourishment.

Treatment.—The remarks on regimen in the last paragraph may be held as applicable here. It is necessary to raise the head on a high pillow to favor the return of blood to the heart. Any exciting cause, such as cough, must be specially treated, at the same time that every effort is made to improve the tone of the circulatory system.

Tonics, diuretics, and mild purgatives are called for.

℞	Ext. ergotæ liq., ...	ʒ iij.
	Tinct. digital., ...	ʒ ij.
	Liq. strychn., ...	ʒ i.
	Aquam chloroform., ...	ad ℥ vi.

M. Sig. Take a tablespoonful in water three times a day.

Here, as in most anæmic conditions of the brain, morphine is admissible, and may be used hypodermically in doses of $\frac{1}{10}$ to $\frac{1}{8}$ of a grain; although remedies which are less prone to disorder the secretions may be tried first; these are paraldehyde, urethane, etc.

Bartholow recommends galvanization of the head in passive cerebral congestion.

Cerebral Anæmia.—The diseases which give rise to this affection were enumerated in Chapter II.

The symptoms vary very considerably with the extent of the cause and the degree of anæmia it induces.

In acute cases the symptoms are rapidly and severely developed; in chronic cases, although existing in a marked degree, they are less keenly felt, and so are better borne. The symptoms may range from a succession of violent convulsions, the result of a profound and sudden loss of blood, to a passing feeling of faintness depending upon sharp pain. When it is suddenly produced the effects are chiefly felt by the special senses, and by the great centres in the medulla oblongata, just as in Flemming's experiments on the compression of the carotids, in which unconsciousness was mistaken for sleep. The patients complain of dimness of vision, noises in the ears, vomiting, sweating, rapid pulse, sighing respirations, etc., indicating the prostration of these several centres, while insomnia is always an urgent source of distress.

In chronic cases—and it is with these that we are more immediately concerned—sleeplessness, or sleep disturbed by

dreams, and general restlessness, are usually prominent symptoms. They present a striking contrast to the drowsiness and languor which prevail throughout the day, when the patient's mental condition is one of weariness and irritability, and his thoughts and memory are confused and defective. The other striking features are briefly, pallor of the surface of the body; coldness of the extremities; pinched face; throbbing or pulsating noises in the ears, sometimes resembling the noises of the seashell; dimness of vision, flashing of light from the eyes, dilated pupils; intolerance to noise and light; small and compressible pulse, frequently "splashing," and generally, although not constantly, of low tension. The cardiac sounds are enfeebled, with bruits in the veins of the neck; respirations are less frequent than natural. Digestion is slow, and the bowels are constipated.

In the cerebral anæmia of children, so closely resembling the early stages of hydrocephalus, which occurs in cases of severe and copious diarrhœa, the patient is very restless, and usually sleeps little if at all; the face is pale, eyes sunken, features pinched, the fontanelles depressed below the level of the bones, while the muscular system generally is relaxed and flabby, and the bodily surface pale and cool. The effects of this state are keenly felt by the nerves and the nervous centres, which, being improperly nourished, show it in their excitability. The psychical, motor, and sensory centres each in their own peculiar way exhibit evidence of this, and discharge their energy under unusually slight stimulations; one of the commonest indications of this being wakefulness and restlessness.

Treatment.—In acute cases, raising the foot of the bed so as to lower the head, with the hypodermic injection of morphine, is of the greatest use. Under no circumstances can the tonic and stimulating properties of morphine be so well studied. The hypodermic injection of sulphuric ether and strychnine may also be resorted to.

In chronic cases the treatment must be directed to the constitutional state ere relief can be obtained. Careful attention to hygienic conditions is absolutely necessary, so that all undue fatigue be avoided, and that the largest amount of oxygen and sunlight be secured for the patient by day, and the greatest freedom from external disturbing agencies by

night. The digestive powers must be improved up to the highest possible point, and the food should be nutritious, and on the lines of that suggested for neurasthenic conditions (p. 590). Alcohol, in the form of red wine, Burgundy or claret; or malt liquor, as ale or stout, in quantity calculated to improve assimilation, must be given. Iron in one or other of its forms, and arsenic, are the remedies to be relied on, and they are best combined with laxatives.

℞	Liq. arsen., ...	ʒ ss.
	Mist. ferri co., ...	℥ x.
	Decoct. aloe. co., ...	℥ ij.

M. Sig. Take two tablespoonfuls thrice daily, after meals.

The tincture of the muriate of iron of the Edinburgh Pharmacopœia combined with sodium or magnesium sulphate acts well. Blaud's pills and arseniate of iron are likewise suitable remedies.

The Sleeplessness of Convalescence.—This practically depends upon the same cause, *i.e.*, cerebral-cell starvation. Evidence of this may sometimes be obtained in the exaggerated reflexes which can be elicited, *e.g.*, in patients recovering from fevers. In this state it is important for the patient to avoid over-fatiguing himself by too much talking, or by sitting up too long, etc., as these indiscretions accelerate the pulse, and they may raise the body temperature, thereby preventing sleep; moreover, care must be taken to avoid over-feeding. Alcohol is an invaluable tonic and hypnotic, a glassful of champagne at bedtime frequently acting like a narcotic. Light food combined with a stimulant, once or twice during the night, is the best form of sleeping agent. Digitalis, strychnine, and quinine in small doses are useful (p. 595). Sponging with tepid water frequently is soothing, while gentle frictions are also provocative of sleep. Change of posture relieves any hypostatic congestion of the brain. If a hypnotic is called for, morphine in small doses is the most suitable.

Degeneration of the Cerebral Arteries.—This is a factor in the causation of cerebral hemorrhage, and it appears to exercise a decided influence upon the nutrition of the cortical substance of the brain.

The symptoms are, displays of emotional feeling upon the

most trivial excitement; drowsiness during the day, even to the extent of falling asleep during meals, and often prolonged sleep at night. But in a certain proportion of cases there is troublesome dreaming, if not pronounced wakefulness at night. To such an extent is this true, that dreaming in advanced years may be held as suggestive of pending apoplexy. Dreams are the source of great annoyance. A physician who had retired into well-merited private life, told the writer that the only miserable time he had was when he was asleep dreaming; he died shortly afterward of apoplexy. This is no uncommon experience. In some cases wakefulness is a marked feature; the arteries, hard and resistent, are no longer capable of responding to the vaso-motor constrictors, so that when sleep should naturally occur, the blood-supply is not moderated, and consequently sleeplessness results.

Treatment.—The sleeping conditions require attention. The bedroom should be comfortably heated, and the bed well warmed before lying down, to avoid any chill, which by repelling the blood from the periphery is apt to aggravate the evil by increasing the cerebral hyperæmia. The feet should be warmed, and the head well raised. The writer has frequently got good results from sponging the nape of the neck with hot water, and from the application of mustard plasters for a few minutes over the epigastric region, or the upper part of the spine. A light repast with a little stimulant at bedtime, just enough to excite some vascular determination to the stomach, without accelerating the heart's action, is frequently sufficient to deplete the cerebral vessels. The sumbul and hop mixture (p. 597), or henbane and camphor (p. 611) are sometimes useful, but as they cannot modify the pathological conditions, they must be used with caution. The bromides and chloral hydrate are best avoided.

It seems convenient here, in connection with this subject, to add a few remarks upon some other forms of insomnia met with in the aged. We have already laid some stress upon the increased amount of sleep they require, and in many instances get. A good sleeping-habit has probably much influence over the prolongation of life. The statistics of forty-four centenarians, collected by the Collective Investigation Committee of the British Medical Association (1886), proved that thirty-four were good sleepers, five were bad, and seven were moder-

ate sleepers. Returns made in twenty-nine cases, indicating the number of hours slept, showed that the average was eight and a half hours; three slept twelve hours, eight slept ten, one slept four, and two slept six hours. Upon the whole these figures show a fair amount of repose.

Dyspeptic Derangement.—This is a fruitful source of sleeplessness. Digestion being slowly and imperfectly performed, the patient complains of weight and oppression over the epigastric region, flatulence and heartburn, the tongue being usually dry and the appetite feeble. This depends upon imperfect innervation of the processes, which leads up to defective nutrition of the whole system. The heart growing weak, and propelling a smaller quantity of blood feebly, the nervous centres become still further impaired. These sufferers are usually drowsy during the day; they drop off to sleep in their chair, but at night on assuming the recumbent posture they wake up and become sleepless. In less pronounced cases these symptoms are only apparent after indiscretions in eating and drinking, which embarrass the enfeebled digestive powers.

Treatment.—This consists in aiding digestion with alcohol. It is best given with meals in quantities short of producing catarrh of the stomach; it is likewise useful at bedtime and during the night. A tablespoonful of whiskey diluted with water or milk, taken at bedtime with a biscuit, grapes or raisins, and repeated if necessary during the night, is a most useful hypnotic. About four or five A.M., when the circulation is depressed, it has no rival. An elderly lady, upward of eighty years of age, who for a few years has derived great benefit from this regimen, practically sleeping quite well, returned to bed one night, having eaten her biscuit and, as she thought, sipped her stimulant, but found she could not sleep. After tossing uneasily for some time she resolved to exceed the prescription by repeating it; when she rose to do so she discovered she had forgotten to drink her quantum, which she then took and was soon asleep, showing that the stimulant is required as well as the food. A cardiac tonic is often usefully combined with the stimulant. Here is a prescription for a mixture which a lady, now considerably over eighty years of age, has had at her bedside for the last thirteen years, and she has generally required to take it once or twice during every night.

℞ Tinct. valerian., ... ʒ iv.
Spt. ammon. arom., ... ʒ ij.
Spt. chlorof., ... ʒ iij.
Tinct. lavand. co., ... ʒ iij.
Infus. digital., ... ad ℥ iv.
M. Sig. Take a tablespoonful in water every four hours when required.

The use of bromides, hydrate of chloral, and other hypnotics, is inadmissible. The food requires to be skilfully arranged.

Pruritus senilis is a distressing source of sleeplessness in the aged, and requires careful management. It is usually met with in persons above sixty years of age, in whom the skin is suffering from the effects of defective nutrition. Many of these afflicted persons are gouty.

It assumes many forms, and is influenced by various circumstances, such as alterations of temperature, and is invariably aggravated by the heat of the bed. It prevents sleep, while the scratching still further increases the distress, just as the wearing of flannel does. It most frequently affects the region of the anus and genitals, and the lower limbs.

Treatment.—The first aim must be to regulate the diet and correct digestive derangements, for these aggravate the itching. Indeed, exacerbations are apt to be caused by indiscretions in eating and drinking. The emunctories should be kept active. Mild mercurials and the mineral acids are very suitable remedies. To promote the action of the skin frequent washings are required. Baths containing borax, bran, or oatmeal are soothing and grateful. Tonics, such as arsenic, strychnine, and quinine, often yield good results, although arsenic in some instances appears to increase the distress. In some cases cannabis indica administered internally, by lessening the conductivity of the sensory nerves, promotes sleep by relieving the itching. Warm baths at night often promote sleep. The use of lanolin has been strongly recommended, and the writer has found it useful mixed with two parts of cerat. galena; and also, with one part of the oleate of zinc and two of pure white vaseline. Boracic acid ointment and lotion, and ointments containing tar, huile de cade, carbolic acid, and menthol are all serviceable. Menthol and carbolic

acid from their odor sometimes prevent sleep. The lotions and ointments should be used warm, as cold applications are prone to initiate wakefulness in the aged by exciting cerebral hyperæmia.

For twenty years the writer has obtained good results from a prescription of Dr. Bowling, of Kentucky, as quoted by Tanner: "I direct that the affected parts be sponged for a minute or so with good apple vinegar, and then allowed time to dry. After this they are to be smeared over with citrine ointment (unguentum hydrargyri nitratis). The applications are to be made twice a day. The cure is usually effected in a week."

Intra-cranial Tumors.—Sleeplessness occurs in the majority of these cases as a consequence of the headache from which the patient commonly suffers. Headache appears early in the disease, and is often the only symptom of the organic mischief; it usually persists night and day, and tends to grow worse at night. It may be excruciating in character, and exceed in severity all headaches depending upon functional disorders, or even inflammatory diseases of the brain and membranes.

It prevents sleep, or interrupts it if it has ensued; and this characteristic is always suggestive of organic disease.

The sleeplessness itself becomes a source of aggravation, intensifying the suffering, and increasing the mental and physical exhaustion.

Treatment.—From the fact that the pain is increased by any active or passive congestion of the brain, such as is caused by visual and auditory stimuli, coughing, stooping, etc., the head should be well raised on a high pillow, in a darkened, quiet, and cool room; and the food should be light and non-stimulating. Cold sometimes relieves pain: ice-bags and Leiter's tubes are convenient modes of applying it. If it is disagreeable to the patient, tepid lotions may be applied. Purgation, by relieving the hyperæmia, is useful. The following has rendered good service:

℞	Iodid. potass., ...	ʒ ij.–ʒ iv.
	Brom. potass., ...	ʒ iv.
	Aq. menth. pip., ...	ad ℥ vi.

M. Sig. Take a tablespoonful every four hours in water.

When there is much arterial tension, ♏ij.–♏iij. of tincture of aconite B.P. may be added to each dose.

When a hypnotic is required to induce sleep, morphine is the only reliable remedy, chloral hydrate having no influence over pain. Morphine should be used in as small doses as is compatible with the end in view. It must not be forgotten that coma is apt, in such cases, to supervene spontaneously.

Cannabis indica has been strongly recommended.

When the diagnosis of such tumors is clearly made out, they pass into the domain of the surgeon.

Insomnia depending upon Affections of the Spinal Cord, Nerves, etc.

Insomnia in diseases of the spinal cord and nerves is chiefly, if not altogether, due to pain, which may be persistently present, or excited by muscular movements. It is proposed to refer briefly to one or two of these affections.

Spinal Meningitis.—Sleep is speedily interfered with by the constitutional disturbance which attends the onset of this malady. There are also present excessive pain in the back, which shoots down the limbs, and is greatly increased by all voluntary movements, and considerably intensified by pressure; muscular rigidity and spasm, associated with frequent startings; hyperæsthesia in the early stages, with formication and tingling; and if it extends to the cerebral meninges, headache and vertigo. The reflexes in the beginning are exaggerated; while paralysis, usually preceding loss of sensation, affects the rectum and bladder, and may, by atrophic changes, give rise to bed-sores.

In consequence of these disturbing agencies sleep is generally very broken, and when it ensues it is dream-laden, or disturbed by sleep-talking, and is apt to be rudely terminated by an exacerbation of pain excited by involuntary muscular movements.

Treatment.—The early recognition of the disease is of vast importance, as there is a risk of its being mistaken in the earlier stages for rheumatism, with which disease it is occasionally associated. The greatest care must be taken to avoid bed-sores by keeping the bed scrupulously clean and smooth; the bowels and bladder being duly watched. Cupping, dry

and wet, along the whole course of the spine, frequently repeated, with the use of mercurial purgatives, is invaluable. The following mixture has been found useful.

℞	Iod. potass., ...	ʒ ij.
	Brom. potass., ...	ʒ iv.
	Liq. ergot. ext., ...	ʒ iv.
	Aq. chlorof., ... ad	℥ vi.

M. Sig. Take a tablespoonful in water every four hours.

It sometimes induces sleep; when it fails morphine must be résorted to; or opium combined with small doses of tartar emetic.

If the potassium salt induces iodism, one of three courses may be adopted. The dose may be increased; or ʒ ij. of tincture of belladonna may be added to the mixture; or the medicine may be taken diluted with a large quantity of water.

Dr. Ross speaks well of warm baths and moist packs as soothing and conducive to sleep.

Myelitis.—The symptoms of this disease are essentially of the same character as those of meningitis—constitutional disturbance, etc., and sleeplessness. The insomnia requires the same treatment.

Locomotor Ataxy.—Sleeplessness is not infrequently associated with this affection, having begun during the course of the disease which originated it, such as severe continued fevers, etc. It may continue throughout the initial stages of the secondary affection, and be perpetuated.

When the disease has developed, sleeplessness usually depends upon the severe lightning-pains, severe and enduring pain in the back, girdle sensations, gastric crises, formication, and pronounced general restlessness, impelling the patient to change his position frequently.

Treatment.—It must be that of the disease. Turkish baths and hydropathic treatment are in most cases beneficial, particularly if conjoined with electrization. Nitrate of silver and iodide of potassium are reliable remedies. Recently excellent results have been obtained, so far as relief from pain is concerned, from antipyrine and antifebrine, the former in doses of 15 grains, frequently repeated, the latter in doses of 8 grains. These remedies promise to be the best hypnotics in this affection. When the pains are violent, as during gastric crises,

morphine must be given freely. The writer has known as much as 20 grains required in 24 hours. Suspension seems, in some cases, to afford good results.

Infantile Paralysis.—Sleep is often very disturbed at the onset.

Neuralgia.—Sleeplessness is often caused by the pain that this ailment induces, as well as by the constitutional state which gives rise to it. It is chiefly seen in the debilitated, or in those who are suffering from some toxic condition.

Hence it is met with in the anæmic and weakly, and in those afflicted by gouty, rheumatic, syphilitic, or malarial poisons. The disease is characterized by severe, even agonizing, unilateral, periodic, and paroxysmal pain. The paroxysms frequently select sleep as the time for their occurrence, and they are usually more severe during the night. The pain is attended by tenderness on pressure over some portion of the nerve; and occasionally is accompanied by swelling, erythematous or herpetic changes in the skin over the nerve.

The sensation of pain being transmitted to the brain keeps it in a hyperæmic state, which is incompatible with sleep, at the same time that it increases the force of the heart's action. Neuralgias receive different names as they affect different cranial nerves, plexuses of spinal nerves, or internal organs or viscera.

Treatment.—It is divided into curative and palliative; the latter is often concerned with the promotion of sleep.

Antipyrine and antifebrine are distinct gains to the materia medica. They both possess the power of relieving pain, especially that of neuralgia, without disturbing the digestive processes. The dose of the former is from 10 to 20 grains thrice daily, and of the latter from 5 to 15 grains.

Morphine and cocaine by hypodermic injection are the reliable remedies for pain; the dose should be limited to that which will ameliorate it. Antipyrine may also be administered hypodermically, either alone or with cocaine.

Local applications of menthol, aconite, veratria, belladonna, chloroform, opium, heat, blisters, and electricity are each and all useful. Electricity is at once curative and an aid to sleep.

In the anæmic and weakly, special attention should be paid to diet, and probably wine must be allowed. Various tonics, as iron, arsenic, phosphorus, and quinine, by improving the general health and by relieving pain, admit of sleep.

In those suffering from gouty, rheumatic, syphilitic, and malarial poisons, the remedies must be directed against these states.

In neuralgia of the fifth cranial nerve, gelsemium with hydrobromic acid and quinine; or the butyl-chloral hydrate will probably suit best.

In brachialgia, rest for the limb, antipyrine, Warburg's tincture, sal ammoniac with belladonna, and nerve stretching.

In herpes zoster, arsenic and quinine.

In lumbago, dry cupping, acupuncture, antipyrine, and sal ammoniac.

In sciatica, fly blisters, dry cupping, acupuncture, turpentine, potassium iodide, and nerve stretching.

In ovarian neuralgia, blisters and potassium bromide are the remedies which have afforded the writer the best results.

In all cases the emunctories must be attended to. Much relief is occasionally gained by the judicious administration of a purgative.

Other painful affections, such as biliary or renal calculi, and like acute ailments, are best treated with morphine in adequate doses. Neuromata should be removed. Cancers and similar chronic painful diseases necessitate the continued use of morphine or cocaine; the former dusted over the open sore has afforded Dr. Thomas Keith excellent results. Given hypodermically, the dose should be kept as small as possible, for unfortunately a time arrives when it no longer acts as a sedative; on the contrary, it seems to act as an irritant, while it demoralizes the whole man. Pure hypnotics have no influence in such cases. They operate, for the most part, directly on the cerebral cells. No remedy is of any avail in painful affections which does not act on the sensory-nerve endings and lessen their excitability and transmitting functions. Belladonna, morphine, aconite, etc., possess such properties—hence their usefulness. Cocaine injected subcutaneously relieves pain, apparently by constricting the arterioles and so rendering the nerve terminals bloodless.

Irritants, such as insects or pediculi; itching, from urticaria and like affections; blistered surfaces, etc., are all able to interfere with sleep; but their presence being recognized and their cure effected, sleep will return. Temporary relief can be obtained and sleep induced by hyoscyamus, cannabis indica, camphor, etc.

CHAPTER VIII

INSOMNIA DEPENDING UPON AFFECTIONS OF THE NERVOUS SYSTEM—*Concluded.*

It is proposed, in concluding these chapters, to briefly discuss insomnia depending upon the influence of certain toxic agents upon the economy.

Alcoholism.—The varying effects of alcohol upon sleep and sleeplessness are due to the susceptibility of the person who consumes it, to the quantity and quality taken, and likewise to the intermingling of various kinds of drinks.

Persons intolerant of alcohol, or unaccustomed to its use, may be rendered sleepless by a very small quantity, probably by its exciting the action of the heart and causing cerebral hyperæmia. If such persons suffer from insomnolency from any cause, alcohol invariably aggravates the symptom.

In those who are accustomed to its strictly moderate use, a small dose at bedtime acts as a hypnotic, probably by establishing a temporary gastric congestion and a corresponding cerebral anæmia. Such persons only realize its hypnotic properties when they try to abandon its use. They then experience for some nights great difficulty in falling asleep, greater difficulty indeed than they would have believed possible.

In this temperate class, a larger quantity of alcohol produces sleep disturbance, and especially when the spirits or wines are impure or unsound, or when they are injudiciously mixed. The quality and admixture appear to exercise as great a pernicious influence as the quantity.

When an overdose of alcohol is taken (and that is a relative quantity) profound or drunken sleep follows, in which the pupils become very contracted. If such a person is disturbed or aroused the pupils dilate, an occurrence that has been made use of in distinguishing between alcoholic and opium poisoning; for in the latter they do not dilate. While the utility of this means of diagnosis is very great, it is really only what

happens in deep sleep, and is in no respect peculiar to alcoholic excess.

The majority of persons who habitually consume alcohol in quantity exceeding physiological limits, although short of inducing delirium tremens, eventually suffer from alcoholism. This is attended by well-marked symptoms during life, and by structural changes in the brain and nervous system which can be studied after death. To the latter we shall refer first.

The dura mater is frequently found adherent to the cranial bones, the arachnoid devoid of its normal transparency, the pia mater thickened, the convolutions, particularly those of the frontal lobes, shrunken and atrophied, and an increased amount of fluid in the ventricles and in the arachnoid spaces. In post-mortem examinations made of the bodies of a very large number of persons who had been addicted to drinking the writer never failed to note these atrophic changes in greater or less degree. Organic changes in the liver, stomach, etc., were equally constant.

During life the patient presents symptoms of mental enfeeblement, in which the intellectual, emotional, and volitional centres participate, as evidenced by incapacity, irritability, and vacillation; eventually he becomes demoralized, deceitful, and untruthful. He complains of headache, depression of spirits, occasional attacks of giddiness, weakness of vision, scintillations, *muscæ volitantes*, and impairment of hearing. He is restless, his muscles tremble and twitch. The tremors are worse in the morning, and manifest themselves mostly in the upper limbs; the twitchings are most marked at night when he tries to fall asleep. He suffers from abnormal sensations of heat and cold, and from formication in the limbs, at times from severe neuralgic pains. His movements are often ataxic, and at times he is paralyzed from multiple neuritis. He is the subject of chronic gastric catarrh, and of liver derangements. Such a patient comes for advice, not on account of his general condition, but for sleeplessness and mental depression, the former becoming very marked in the later stages. Sleep is either absent or disturbed by frightful dreams, nightmare, and general restlessness. It is the reverse of refreshing, and the patient gets up in the morning feeling miserable, and full of dread and dismay. Sleeplessness depends conjointly upon the noxious effects of the poison on the cerebral cells,

hyperæmia of the brain, the vaso-motor paresis which follows, and the accompanying digestive troubles.

In cases less pronounced, such as are induced by alcohol only slightly in excess of physiological limits, sleep may be deep and heavy in the early part of the night, but it terminates about four or five o'clock, and does not return till nearly the hour for rising. A history of wakefulness occurring at that hour, and accompanied with restlessness, should always suggest, at least, the possibility of its being alcoholic.

Treatment.—All stimulant must at once be withdrawn from those who can bear its withdrawal, and materially reduced in the case of those who are enfeebled. The food must be carefully arranged. The first indication is to unload the liver and restore the digestive powers. This may be accomplished by means of a calomel purge, followed in the morning by a dose of one of the natural saline waters, and an alkaline mixture before meals.

℞	Bicarb. potass.,	ʒ iij.
	Tinct. nucis vom.,	ʒ ij.
	Liq. arsen. sodii,	ʒ ss.
	Tinct. capsic.,	ʒ ss.
	Infus. cascaril.,	ad ℥ vi.

M. Sig. Take a tablespoonful in water thrice daily before meals.

The nux vomica by influencing the vaso-motor centres acts in many cases as a hypnotic. Warm applications, as a mustard plaster or a compress over the stomach and liver, are useful adjuncts to treatment. For some nights it is necessary to administer a hypnotic to insure sleep. There are many which act admirably; probably the best are hydrobromate of hyoscine, chloral hydrate, paraldehyde and sulphonal; but the monobromide of camphor and amylene hydrate are also suitable. Antipyrine relieves headache, nausea, and the sense of sinking, and occasionally promotes sleep.

During convalescence, electricity, change of air and scene, sea-bathing, and a mixture of strychnine and quinine with dilute nitro-muriatic acid, are the best remedies to establish health and restore sleep.

The Morphine Habit.—Morphine taken for any length of

time leads to sleep disturbance, while its discontinuance is followed by pronounced insomnia.

Disturbed sleep from this cause is difficult to diagnose, for the reasons that, in the early stages of mild cases, the objective symptoms are less marked than those in the case of alcohol, and that there is usually a strong desire on the part of the patient to conceal the fact that he is addicted to the use of narcotics; indeed, he may be striving to abandon the habit. In the later stages, and in pronounced instances, this difficulty disappears.

The practice of taking morphine by the mouth or hypodermically has increased rapidly of late years, and has largely displaced the consumption of opium in the solid and liquid forms. Many of the persons addicted to it are quite above the suspicion of such a habit, and discharge high and important duties with ease and *éclat.*

The quantity taken may range from half a grain to twenty or more grains in the course of twenty-four hours.

Such patients complain that their nights are wakeful, though quiet; or if sleep does come on it is disturbed by dreams, and in the morning they awake unrefreshed, miserable, and dispirited. After a time, longer or shorter, depending upon the strength of the patient and the quantity taken, morphine produces well-marked modifications in the nervous system generally. The intellect is enfeebled; the emotional centres display their weakness in increasing excitability, and the volitional in demoralization; the control of the will is in abeyance; the disposition is changed; men deeply religious and scrupulously punctilious grow deceitful and untruthful. They suffer from severe neuralgic pains in the limbs; from hyperæsthesia or anæsthesia; from muscular twitchings and tremblings, the twitchings being more marked during the night when they are at rest in bed; and from perversion of the special senses and defective vision. The eyes are dull and expressionless, the pupils generally contracted, but not always so. They suffer from the effects of enfeeblement of the vasomotor centres, as well as of the centres which control the cardiac, respiratory, and digestive functions, etc. Itching of the skin is occasionally very troublesome.

Treatment.—This obviously consists in breaking off the habit, which in all cases is extremely difficult. The persistent

insomnia which accompanies the attempt, lasting through days and nights, may endanger life. Much difference exists in the ability of persons to abandon the habit. In a recent case in which insomnia, neuralgic pains in the limbs, general emaciation, etc., were clearly due to morphine that had been taken for some years subsequent to a painful illness, the patient abandoned it from the moment he was advised to do so; but the struggle was such that he said, if he ever again acquired the habit, he would not attempt to give it up. Such an experience is by no means uncommon, though it is not the usual one. The habit appears to be more easily relinquished if the drug has been used for the relief of pain, especially if the pain abates.

Many patients, who during days and weeks have taken enormous doses of morphine for pain, are able to abandon the practice easily and quickly. The writer has known a patient do this, who had taken for some time as much as seventeen grains every twenty-four hours. A good deal depends upon their temperament.

Where the patient can at once and forever give it up he should do so. Dr. B. W. Richardson, who has given the subject much careful consideration based upon the observation of a large number of cases, thinks that in aggravated instances a gradual plan is to be preferred ("Asclepiad," 1884). With this the writer is in accord. The trial necessitates the isolation of the patient, and the services of two trustworthy nurses, and careful feeding. Ammonia and wine must be administered when there are symptoms of great weakness. As soon as possible strychnine and arsenic should be given.

℞ Liq. arsen. hydrochl., ... ʒ ss.
Liq. strychnin., ... ʒ i.
Tinct. quinin., ... ʒ xivss.

M. Sig. Take a teaspoonful in water before meals thrice daily.

Since the introduction of sulphonal, the writer has had one such case under his care, and his experience of this remedy was so satisfactory that in future he will give it an extended trial. Change of air and scene are generally required in the convalescing stage.

The Chloral Habit.—Chloral hydrate taken for any length

of time, even in strictly medicinal doses, is apt, like opium and morphine, to create a habit, particularly in those possessing a neurotic temperament.

It is in many respects a more dangerous medicine than morphine. At first the mental depression and melancholia from which the patient suffers are alleviated by a dose of the drug; after a time it fails to soothe, and it may even excite. The victim gravitates into a pitiable state of mental weakness and demoralization, becoming childish, vacillating, and untruthful; sometimes dejected, at other times excited, and having suicidal tendencies. The symptoms are due to cerebral anæmia and enervation of the heart, lungs, etc.

The large number of deaths which have followed the use of this drug points to the care with which it should be prescribed. The sleeplessness of the chloral habit is the symptom which calls for the most urgent consideration in the attempt to break that habit.

Treatment.—This consists in isolating the patient, so as to render it impossible for him to get or take the drug surreptitiously. He must be fed with light and nutritious food at short intervals, and stimulated with diffusible agents, such as ammonia and camphor. In convalescence, citrate of caffeine acts most beneficially, while change of the physiological conditions of life does much to complete the cure. Supervision, however, is necessary for several months. Strychnine is likewise serviceable in combination with tincture of hydrastis.

Cocaine Habit.—The administration of cocaine appears to be accompanied by a risk of forming a habit which is attended by sleeplessness. Several such cases have come under observation. Of the poisonous qualities of the drug there is abundant evidence.

In December last, the writer saw in consultation a case of chronic cocaine-poisoning, complicated by small doses of chloral hydrate; but the symptoms of the former poison predominated. It was characterized by great excitement, hallucinations chiefly connected with sight and hearing, and associated with animals. The patient believed her skin was full of small insects, and that her room was infested by serpents and other reptiles. The lower limbs were so enfeebled that she was almost paraplegic; while her sleeplessness was of the most pronounced kind. She was isolated, well and carefully nursed, and fed

with suitable food. She took with the greatest benefit gr. 20 of sulphonal for several nights; and during her convalescence, which was rapid, a mixture containing nux vomica.

In February, 1889, after an operation for hemorrhoids, she became afflicted with pain at the entrance to the vagina, for which her attendant prescribed a 22-per-cent ointment of cocaine, and being ignorant of its nature she used it freely. Speedily she began to develop peculiar symptoms, which increased, until the former symptoms of sleeplessness, hallucinations, and paresis of the limbs were all markedly present: the knee-jerk was greatly lessened if not alogether absent. Their import was recognized, and traced to their true origin. The remedy was abandoned, and she steadily recovered.

Tea and Coffee.—These pleasant, refreshing, and sustaining beverages are used almost universally in the morning at breakfast to dispel any traces of sleep. It has been astutely remarked that we drink alcohol at night to woo, and tea in the morning to drive away, sleep. Tea and coffee have a very decided effect upon the nervous system. In strictly moderate quantity they promote mental activity, which is evidenced by an accelerated rapidity of thought and clearness of judgment; and they strengthen and invigorate the body. They are largely used by the wearied and jaded on account of the mental exhilaration they induce—an animation which is not followed by depression. They are employed to relieve many forms of headache; and so positive are their anti-hypnotic properties that they are used (by those who wish to continue their labors into the night) to prevent sleep. For a like reason they are called into requisition in narcotic poisoning; and they have been prescribed in many febrile and inflammatory diseases to dispel slight stupor.

Tea and coffee have been credited with the power of acting upon different regions of the cerebrum, and so producing varying effects. They certainly act somewhat differently on the economy; coffee being less stimulating and restorative than tea, and thus less productive of wakefulness; but it is more prone to derange the biliary organs.

They each contain several similar principles. Three of these may be named: a volatile oil; alkaloids, theine and caffeine; tannin and caffeo-tannic acid.

A Volatile Oil.—It is this that imparts the characteristic

aromatic taste and odor to tea and coffee. According to the analysis of Mulder, black tea contains 0.60 and green tea 0.79 per cent. This is one of the constituents of tea and coffee that influence the brain and nervous system. Taken in excess it causes a train of nervous symptoms, among the most marked of which are tremors and sleeplessness. On account of the larger quantity that green tea contains, it is usually selected as a remedy in cases of opium-poisoning. As the oil is imbedded in the cellular tissue of the leaf, it is evident that time is required for its complete extraction. This explains, to a certain extent, why tea infused for a long time is more apt to render persons wakeful. When the oil has been extracted (being volatile) it is easily driven off by boiling, and even by exposure to the air. Mr. John Borland, F.C.S., of Kilmarnock, has suggested that the oil enters into combination with the theine and forms a compound which is more soluble than the tannate, and consequently is absorbed more quickly in the stomach. He bases this opinion on the fact that theine is readily soluble in several volatile oils at 180° Fahr., while it is only soluble in 75 parts of cold and in 9½ of boiling water. He has suggested also that an infusion of tea containing milk and cream favors this combination, as the tannic acid precipitates the casein of the milk and allows the theine to unite the volatile oil. He argues from this that an infusion of tea containing milk or cream should stimulate more quickly than one without these additions. The writer has met with no facts to bear this out so far as tea is concerned. He has, however, been often told by patients that they could drink *café noir* after dinner and sleep soundly, while *café au lait* rendered them wakeful.

Alkaloids.—Theine and caffeine. These are obtained from tea and coffee respectively. They appear to resemble each other very closely, if, indeed, they are not essentially the same substances. It has, however, been pointed out by Mays that theine injected hypodermically possesses certain local anæsthetic properties, and that it interferes with sensation in frogs; effects that are not caused by caffeine.

Theine exists in green and black teas in almost identical quantities, and in amount considerably exceeding that found in coffee. It appears to be a tolerably constant or equable constituent of tea. Paul and Cownley, who analyzed twenty samples of Indian and Ceylon teas differing widely in price,

reported that the theine varied from 4.66 per cent in the highest class, to 3.22 per cent in the lowest. They likewise pointed out that an ordinary spoonful of tea contains about sixty grains, and that an infusion of that quantity of an average tea (4 per cent) yielded in five minutes over half of the two and a half grains it contained, about one to one and a quarter grains of theine. (The size of the particles of tea with reference to the quantity that ordinary spoons are capable of holding, is a point of some importance. Dr. E. Smith, who first attracted attention to this point, formulated a table, from which the following items are extracted:

Kind of tea	Weight of a spoonful in grains.	Number of spoonfuls in a pound.
Black:		
Oolong,	39	179
Congou, inferior quality,	52	138
Flowery Pekoe,	62	113
Souchong,	70	100
Congou, fine,	87	80
Green:		
Hyson,	66	106
Fine Imperial,	90	77
Scented Caper,	103	68
Fine Gunpowder,	123	57

Retailers who are alive to the fact that the smaller the tea the more there is consumed, try to supply it in as broken a state as possible. This is worth bearing in recollection, as teaspoonfuls of tea may be very different quantities.)

Theine and caffeine exert a decided influence over the medullary centres, increasing the force of the heart, and at first raising the blood-pressure. They also act as diuretics. Tea and coffee produce much more marked wakefulness than the quantity of theine and caffeine they contain would do if taken alone. This is due to the volatile oil.

Tea contains a large amount of tannin, and coffee of caffeotannic acid. The former impedes in a very decided manner, and the latter in a less marked way, salivary and gastric digestion. This well explains the dyspepsia and wakefulness which follow the use of tea after dinner in certain cases. Tea, retarding the solution and digestion of starches and albuminoids, is obviously the reason why that most objectionable of

all meals, "high tea," so frequently disturbs sleep. It appears, however, to delay the digestion of some nitrogenous foods more than others, as it does not retard that of smoked, dried, or cured fish or flesh.

According to Mulder, green teas contain a larger quantity of tannin than black teas; he states the proportion to be 17.80 and 12.88 respectively. The bulk of the tannin is given off by infusion very quickly. Sir William Roberts, who investigated this subject, wrote: "Some persons have supposed that by infusing tea for a very short time—only two or three minutes—the passing of the tannin into the solution could be avoided. This is a delusion; you can no more have tea without tannin than you can have wine without alcohol." It would, however, seem to be equally proved that more tannin is given off by long infusion.

Some experiments with reference to this point were made by Dr. Hale White, and recorded in the "British Medical Journal," 1889.

"A, was the finest Assam; B, the finest China; C, common Congou; no green of any kind being used."

Mark of sample.	Percentage of tannin by weight extracted by infusion for 3 minutes.	Percentage of tannin by weight extracted by infusion for 15 minutes.
A	11.30	17.73
B	7.77	7.97
C	9.37	11.15

It is therefore evident that an infusion of tea cannot be made without its containing tannin, notwithstanding the statements to the contrary which are made in some quarters; and that long infusion extracts tannin and theine in larger amounts.

The effects of tea, like alcohol, upon the human economy are so diverse in different individuals that an analysis of the facts must be attempted.

For all practical purposes tea-drinkers may be divided into four groups.

1. Those who can drink tea in almost any quantity and at any hour with impunity, and sleep naturally. This is a very limited class.

That the use of tea is productive, in the healthy, of less harm than is popularly supposed, seems evident. Careful

inquiries made of twenty gentlemen who had followed the occupation of tea-tasting in London during several years, elicited the fact that not one of them suffered from sleeplessness; on the contrary, they were all good sleepers. In most instances they affirmed that they slept better when attending to their business than when they were on holiday. These experts of Mincing Lane taste and value, on an average, at least a hundred and fifty samples of tea every morning before the auction sales begin. Some of them complained that an unusually heavy morning's work induced a sense of sinking in the epigastrium and nausea, which luncheon relieved. Not one of them was sensible of any loss of taste, nor were they affected with nervousness. Three complained of constipation and one of diarrhœa. They were unanimously of opinion that their profession was not detrimental to health.

This evidence, while it goes to prove the tolerance of certain persons to tea, must be accepted with this reserve, that it seems probable if any one of these gentlemen had found himself rendered sleepless early in his career, he would have abandoned the calling. It is also to be remembered that the tasting is done in the morning, and therefore is not so likely to disturb sleep as drinking tea at night.

2. Those who can drink tea of particular quality and in fair quantity at any hour, and sleep soundly. These constitute a class who are, under certain conditions, sensitive to certain varieties of tea, and who occasionally have their sleep interfered with from this cause. For example, they are rendered wakeful by green or Indian teas, or very new teas, especially if these are over-infused. This, however, really depends upon their general health at the time. When they are overworked or slightly dyspeptic they are apt to suffer in this way. Many of these persons exhibit idiosyncrasies; some can drink tea immediately before going to bed and sleep soundly, who would be rendered wakeful if they took tea shortly before or after dinner. This class embraces a larger number than is generally supposed, and they usually fail to connect their sleep disturbance with the use of tea.

In such cases, the origin of the wakefulness having been determined, two things are necessary. Attention should be directed to the health, so as to amend the temporary derangement. They must be advised to select a China or Ceylon tea,

preferably the former, as it contains less tannin (p. 645); to infuse it only five minutes; and not to drink it too hot. It might be mentioned that 2 per cent of the bicarbonate of soda, as suggested by Sir William Roberts, to counteract the effects of the tannin, may be added to the tea· that is, about one grain to each ordinary spoonful.

3. This embraces a class of persons who possess nervous systems either congenitally feeble or weakened by various debilitating causes. For example, many young persons of a neurotic diathesis, and neurasthenics and dyspeptics, are peculiarly sensitive to the use of tea of all kinds, even in small quantities. These persons are liable to exhibit the same train of symptoms as accrues from the abuse of tea. In this class the tea is not at fault at all; it simply renders more apparent a departure from health already existing. A man toiling into the night may be rendered wakeful by tea, but it must not be overlooked that he might have been wakeful without it. There is little doubt that tea has to bear more blame than it is entitled to. In every case where it appears to unduly disturb sleep the state of the health should be narrowly scanned.

In such cases the use of tea must be interdicted, and means adopted to remedy the enfeebled condition.

4. This includes a number of persons of both sexes and of all ranks of life, who have acquired a tea-drinking habit, and who suffer from sleeplessness as a symptom of their excesses. The symptoms they exhibit are all referable to the brain and nervous system. These may be stated thus: sleeplessness, or sleep disturbed by dreams or nightmare; headache; irritability of temper, developing in some instances into hysterical excitement; depression; hypochondriasis; disorders of the special senses, auditory and visual disturbance (a form of tea amblyopia has been described); neurosal palpitation; dyspepsia; intestinal torpor, with its concomitant symptoms of flatulence and constipation; neuralgia, and muscular enfeeblement and tremors follow.

In these cases the use of tea must either be abandoned altogether or reduced to the lowest possible point. If any is taken it should be weak, and neither long infused nor too hot. The following will be found a useful remedy.

℞ Liq. strychn., ... ʒ i.
Tinct. quinin., ... ʒ vi.
Spt. ammon. arom., ... ʒ vi.
Aq. chlorof., ... ad ℥ vi.
M. Sig. Take a tablespoonful thrice daily in water.

For four or five nights four grains of the monobromide of camphor may be given. As tea is not a cumulative poison it is soon eliminated from the system.

[It may not be out of place to add a few remarks on the various teas met with in commerce. For much of the information they contain the writer is indebted to Mr. G. Morison.

China teas may be divided into three large classes.

Green Teas.—These owe their peculiar properties to their mode of manufacture rather than to any constituents they originally contain. Black tea could be manufactured from the same leaves, and this would be devoid of many of the characteristic properties of green tea. The chief varieties are Pinhead Gunpowder, Young Hyson, Gunpowder and Hyson. The first two are the finest. They are now little used in this country. Practically they are not put into blended teas except by special request. Consequently, the sleeplessness induced by some teas is not to be largely accounted for by the presence of green tea. A large proportion of the green tea sold in London for home use is consumed in the district of which Nottingham is the centre.

Scented Teas.—These consist of Caper, Canton, and Foochow, Orange Pekoes, and Oolong. The first two are scented with jessamine, orange blossom, etc. Tea very readily absorbs the flavor or perfume of adjacent articles. These scented teas, which are tolerably astringent, are used chiefly in England for blending purposes, imparting, as they do, point and pungency. They are most largely consumed in the great centres of Birmingham, Manchester, and Nottingham.

Black Teas.—These teas are divided into two large classes, Kaisow and Moning, which are again subdivided.

Kaisow: this embraces the Seumoo, Sueykut, Ching Wo, Paklin, Lapsen-Souchong, Paklum, and Newmake.

Moning: this includes Kintuck, Ningchow, Oonfa, Kutoan, and Shamtam, the last name suggesting the lowest quality.

The names of many familiar teas will be found wanting

from these lists, for the reason that they have disappeared from commerce. The black teas of China are much used in Great Britain. They are not too astringent. The better qualities are full-bodied and aromatic. The Ching Wo and Kintuck have probably the most flavor.

Indian Teas.—These are in great request in this country. They probably represent one-half of the whole tea consumed. They come principally from Assam, Cachar, Sylhet, Darjeeling, and Kangra Valley, although a quantity also comes from Neilgherry and Travancore.

They are all more astringent than China teas; the Assam most of all (see p. 648). The Cachar and Sylhet are not so pronounced in character. The Darjeeling, Neilgherry, and Kangra Valley teas are chiefly used for flavoring, though they are sometimes drunk alone, which the others could not well be. Indian as well as Ceylon teas are divided into classes according to the leaves from which they are obtained. The smaller or younger leaves, being more succulent than those which are fully grown, yield the finest teas. In order of value they are met with in commerce as Broken Pekoe, Pekoe, Pekoe-Souchong, and, the lowest quality, Souchong or Congou. Broken Pekoe contains the tips, Pekoe the first three leaves of the plant, Pekoe-Souchong the leaves of older growth.

Ceylon Teas.—These are much in request owing to their soft, silky, and pleasant flavor. They are often drunk without being blended. They are more astringent than China, but less so than Indian teas.

Java Teas.—These teas have of late years been imported in considerable quantity into this country for mixing and blending purposes. Being unusually good-looking teas, they improve the appearance of China and Indian teas. On account of their unpleasant flavor they are seldom drunk alone.]

Tobacco.—Much difference of opinion exists as to the benefits derived from tobacco in moderation. Many consider it obnoxious, but, on the other hand, it is difficult to believe that such a widely-spread custom as smoking, carried on through centuries, should be specially deleterious.

Many aged persons have smoked throughout their lives not only with impunity but apparently with advantage. In the statistics accumulated by the Collective Investigation

Committee of the British Medical Association, thirteen out of forty-five centenarians used tobacco. Seven smoked much (four females); two smoked little (one female); three smoked moderately (one female); while one chewed tobacco.

Used in moderation, it probably promotes sleep in the majority of persons, many finding a pipe or cigar before going to bed indispensable. There is a minority upon whom tobacco always acts deleteriously, and whose sleep is disturbed by it. This disparity depends upon the stability of the nervous system of the smoker, and to some extent on the strength of the tobacco.

The first effect of tobacco on the nervous system is that of a stimulant; the second, that of a depressant. In excess it causes headache, mainly occipital; giddiness; mental depression; and in some instances it impairs the senses of hearing, smell, and vision; in the latter case, amblyopia and scotoma are met with. Sleeplessness is a frequent symptom, and it usually appears about four A.M. Depressing the great centres in the medulla oblongata, it leads to vaso-motor paresis, and to defective innervation of the heart, lungs, and digestive organs. Affecting the spinal cord and nerves, it produces trembling and weakness of the limbs.

Sleeplessness is due jointly to vaso-motor paresis, cardiac enervation, and digestive derangements.

It is most commonly met with in smokers who have reached middle life, whose nervous systems are beginning to feel the strain of work, or whose metabolism is being imperfectly performed on account of a defective liver. The diagnosis is assisted by the aspect of the patient, who generally presents some symptoms of vaso-motor paresis.

Treatment.—This consists in avoiding tobacco. As it is not a cumulative poison it is quickly eliminated from the system. For a few nights the wakefulness may be increased, but sleep will soon return. During these nights the administration of four grains of the monobromide of camphor is desirable. Tonic remedies are called for to restore the tone of the nervous system generally.

CHAPTER IX.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE ALIMENTARY CANAL.

GASTRIC DYSPEPSIA.

SLEEPLESSNESS, more or less pronounced, is a common if not constant symptom of every variety of digestive derangement. It occurs in the acute attack which follows an occasional indiscretion in eating; likewise in many chronic forms, and in these latter it may be the sole symptom of the derangement.

Sleeplessness of the most obstinate and intractable kind can be initiated and perpetuated by diverse dyspeptic conditions, so obscure in their nature as to elude detection for lengthened periods of time. In short, it may be caused by many disorders arising primarily in the alimentary tract, and by others, induced secondarily by disturbances (as fevers, etc.) in the economy.

The analysis of insomnia from such causes is so intimately and inextricably associated with the whole question of digestion, that at the risk of appearing to digress from the subject immediately under consideration, it is proposed to review some points bearing upon the physiology and pathology of the processes of digestion. This is the more called for when we reflect that it is only by unravelling the nature of the disorder, and by instituting a well-matured plan of treatment for its rectification, that the sleep disturbance—its symptom—can be successfully alleviated. To attempt to deal with such cases by means of hypnotics or narcotics, the majority of which tend to derange the secretions, is worse than useless. It is to court failure and to aggravate the evil. For the unconscious and perfect performance of digestion, certain conditions are essentially necessary. Integrity of all the structures concerned: stomach, liver, intestines, and the various secre-

tory glands. A vigorous nervous system. A normal blood supply. Healthy secretion. Suitable ingesta. When either one or more of these requisites fail, digestion is imperfect, and consequently leads, among other evils, to insomnia.

We must now proceed to study the causes of dyspepsia in the order given, with special reference to their influence upon the character and amount of sleep.

Defective Structures.—All inherent or acquired debility of the stomach, as well as any abnormality in the viscus, initiates dyspepsia. Among the abnormal conditions may be enumerated, alterations in size, such as contraction from prolonged fasting and other causes. Dilatations, either primary, from enfeeblement of the muscular walls, which may not only interfere with their contractile power, but permit of distention of the viscus under certain circumstances; or, secondary, from organic obstruction of the pylorus. Atrophy or hypertrophy of the walls, and cancerous growths, must be mentioned; as likewise affections of the mucous membrane, *e.g.*, catarrhal, inflammatory, ulcerative, and degenerative changes. These latter may not be accompanied by marked symptoms, as the mucous membrane (except near the orifices) is comparatively little sensitive.

In like manner all alterations in the calibre and structures of the intestines become disturbing agents, while modifications of the secretory glands, and impairment of the tissues of the liver, uniformly lead to faulty hepatic, intestinal, and gastric digestion.

When the tissues are all inherently strong, they are capable of discharging their functions easily and well; if one is weak, the strength of the whole is impaired.

Defective Nervous Arrangements. Central.—The whole evolution of digestion is under the dominion of special nervous centres, and of cerebro-spinal and sympathetic nerves. The presence of food in the mouth instigates afferent impulses which are transmitted along cerebro-spinal nerves to the medullary centres; these reflexly produce hyperæmia of the salivary glands, and excite a flow of saliva. When the food passes into the stomach impressions similarly aroused are conveyed by the vagi, which reflexly institute congestion of the gastric glands, and as the result of the stimulation, gastric juice is poured out. Like arrangements control and regulate

the periodic formations of bile, and of the pancreatic and intestinal juices.

A stable nervous system is required for the adequate innervation of the secretory glands, so that the various secretions may be normally excited (and not over-excited) by the normal stimuli. The medullary centres which control the secretory functions are themselves dominated by the highest centres in the brain. The psychical centres are in concord with the whole digestive metamorphoses, each one reacting on the other.

Acute psychical disturbance, *e.g.*, fright, is able to arrest digestion at any stage. It can inhibit the vaso-motor adjustments, and incite contraction of the arterioles of the various secretory glands, and so cause arrest of the secretions. In the case of the salivary glands this is indicated by the dryness or stickiness of the tongue, which is popularly spoken of as sticking to the roof of the mouth. The gastric glands evince the same disturbance. The late Dr. Beaumont has recorded among his observations upon the person of Alexis St. Martin (a young Canadian, the subject of a gastric fistula), that mental emotion checked the secretion of the gastric glands, and that the villous coat of the stomach became dry and red, and at other times pale and moist, having lost its smooth healthy appearance.

Less sudden mental activity, such as overwork, anxiety, grief, worry, etc., acts similarly, and if more slowly, not less surely. Sensations produce different effects in accordance with their character. Depressing emotions delay and derange, while pleasurable sensations quicken and promote, digestion. Conversely, digestive derangements react upon the brain, causing depression, irritability, and restlessness, as well as headache, giddiness, and disorders of the special senses.

From this it is obvious that if impressions originated in deranged processes, and conveyed to the brain during waking moments, can occasion such decided effects, then sensations produced by like phenomena, and similarly transmitted during sleep, must necessarily disturb the repose of the brain, and lead to molecular movements in the cells, and to a consequent hyperæmia: this is specially true when the cells are irritable and impressionable.

Everything that interferes with the integrity and nutrition

of the nervous system leads to digestive derangements. This is frequently seen in cases of exhaustion of that system brought about by insomnia from whatever cause. It is often noticeable in middle age, when the effects of the strain of life begin to tell upon the structures. Many intractable dyspepsias, characterized by extreme pain and bulimia, originate in the enfeeblement induced by fatigue, excesses, and debilitating diseases.

The nervous system, in addition to governing the formation of the various ferments, presides over the churning and peristaltic muscular movements of the stomach, which are essential for the efficient chymification of the food. These movements begin shortly after the food enters the viscus, and cease when gastric digestion approaches completion, when the pylorus, relaxing, permits the contents to be discharged into the duodenum, where the movements are propagated throughout the intestinal canal. Although these peristaltic contractions are under the control of special ganglionic plexuses in the muscular coats of the stomach and intestines, they are likewise influenced by the vagi. Fright can arrest them altogether, or excite them so as to produce diarrhœa, by unduly hastening the transit of the intestinal contents. Conversely, during sleep, disorderly or arrested movements occurring before the completion of digestion initiate sensations which are transmitted to the brain and bring about awaking. Enervation of the system impairs the movements, and this is a frequent cause of slow digestion, constipation, and of flatulent distention of the stomach and bowels.

Peripheral.—Undue irritability of the nerve endings may cause pain and gastric discomfort. The nerves being composed largely of fibres, which permit of considerable dispersion of the nervous currents, pain is obscurely and indefinitely described and localized; varying from mere uneasiness, a feeling of weight, and gnawing, to excruciating—even agonizing—pain; while it may radiate through the chest and abdomen, through the shoulders and down the limbs. The time of its onset in relation to food is very often indicative of its cause, as in ulceration. (It seems probable that modification of the terminal endings of the nerves causes the large and abnormal appetite which occurs in some forms of dyspepsia.) Excessive muscular movements may be excited by poisons and irritating

ingesta; or they may be paralyzed by causes, such as peritonitis, gastric and enteric ulcers. Locally limited by tight lacing, and the constrained postures necessitated by some occupations. Interfered with by growths in the walls of the stomach, by dilatations of the stomach, and by adhesions in the abdomen.

In health the complex functions of the nervous system connected with digestion are executed so unconsciously that a man would not be aware he possessed a stomach were it not for the recurring sensations of hunger.

During sleep, digestive functions are practically suspended, the medullary centres relax their activity, digestive fluids are not secreted, and the movements of the gastro-intestinal canal almost, if not entirely, cease. This cessation of movement affords a strong argument against sleeping after meals. Everything which prevents the digestive quiescence induces disturbed sleep.

It has already been pointed out that external stimuli applied to the body during sleep produce contraction of the cutaneous arterioles and a concurrent cerebral hyperæmia. Internal influences act in a similar way. The vagi convey sensations arising from internal derangements to their roots in the medulla, and these sensations, extending to the adjacent centres, instigate cerebral hyperæmia, which awakens the sleeper. For example, if a man takes a large and indigestible meal shortly before going to bed, when he falls asleep the circulation of the blood becomes slower, and the movements of the stomach abate; digestion is arrested. Impressions originated by this interruption produce, in the manner described, cerebral congestion and consequent activity, and as the influx of blood affects the motor or psychical centres, it occasions diverse symptoms. The sleeper becomes restless and dreams, or suffers from nightmare or sleep-walking, or he may awake to find himself feverish and oppressed, and tossing from side to side, or turning round and round as if he were trying to convert himself into a wheel. Eventually, the nervous impressions spread to, and affect, the centre for vomiting; under its co-ordinating influence emesis occurs, and relieves the stomach of its disturbing contents. The *origo mali* being removed, the cerebral circulation becomes quiet, and sleep returns.

When the derangement is more pronounced, sleep may be prevented; when it is less marked, restlessness and dreams are the only features. Many cases of wakefulness, lasting for two or three hours during the night, are due solely to arrested muscular movements in the stomach or in the intestines.

It goes without saying that such sleep disturbance is more commonly met with in those whose digestive arrangements are weak, and liable to become deranged.

Dyspepsia may be instigated through the ramifications of the nervous system in sympathy with other organs. For example, gastric symptoms are of common occurrence in connection with diseases of the heart, kidneys, and uterus, and they thus act secondarily as disturbers of sleep.

Abnormal Vascularization.—The constituents of the various digestive juices being obtained from the blood (the late Dr. Chambers wrote: "The daily quantities of these fluids, as estimated, mainly, from the results of Drs. Bidder and Schmidt's experiments, may be reckoned, at least, to equal the following: Of saliva, 3¾ pints; of gastric juice, 12 pints; of bile, 3¾ pints; of pancreatic juice, 1½ pints; of intestinal juice, ½ pint; making in all nearly three gallons"), it is essential for the formation of these fluids that the glands which elaborate them, should, in response to proper stimulation, become hyperæmic. If the supply of blood is deficient in quantity or altered in quality, the constitution of the juices suffers corresponding modifications. Coincident with the onset of digestion, a great influx of blood takes place into the vessels of the stomach, which, besides contributing to the formation of the gastric juice, stimulates the muscular movements of the viscus.

Probably the consequent depletion of the distant parts explains the chilliness of the extremities, and the drowsiness, which sometimes follows a full meal.

If anything deprives the stomach of an adequate sanguineous supply, such as happens when active brain-work entailing hyperæmia is continued during and immediately after meals, digestive derangements ensue.

On the other hand, abnormal and persisting determination of blood to the stomach or intestines becomes a source of disturbance, by occasioning catarrhal and inflammatory diseases of the mucous membrane of the stomach, *e.g.*, in alcoholic excess. Dr. Beaumont observed in St. Martin that stimulating

liquors and overloading the stomach led to these vascular derangements, occasionally causing red spots and abraded patches on the mucous membrane; at other times, deep red patches from venous congestion. In these catarrhal conditions mucus is formed, which delays digestion by coating the food and preventing the gastric juice from acting upon it.

Passive congestion of the stomach and bowels, depending upon obstruction to the free return of blood to the heart, such as occurs in some diseases of the heart and liver, occasions digestive troubles, and at times increased peristaltic movements.

When the blood supply is altered, as in anæmia, in which there is an insufficiency of oxygen-carrying corpuscles, or when it is imperfectly aerated by vitiated air, or laden with the *materies morbi* of a disordered metabolism, as in gout, digestion is invariably imperfect. Blood charged with peptones, digestive products (ptomaïnes?), or with uric acid, is unsuitable alike for the digestive processes and for cerebral nutrition. To this subject we must revert presently.

In the majority of cases of insomnia arising from gastric dyspepsia it seems almost certain that there is no marked mal-nutrition of the cerebral cells; consequently, they are not unduly perceptive. On the contrary, they are only aroused into activity by sensations sufficiently pronounced to disturb sleep under normal conditions.

In a minority of such cases, a close study of their peculiarities, renders it probable that they are brought about by the morbid products of a deranged digestion entering the circulation and so affecting the cerebral cells as to cause awaking.

The influences of such blood on the bodily tissues can be well studied in the various affections of the skin, which so frequently appear in their train.

Faulty Secretion.—The secretions are individually and relatively important, effecting, as they do, the chemical changes in digestion. If the digestive changes are to be satisfactorily accomplished in the aggregate, each ferment must in rotation perform its proper and adequate share of the work. The saliva dissolves the saline matters, and converts the starches into dextrin and maltose; the gastric juice acts on the proteids or the albuminoids, and changes them into true peptones, etc.

When food is eaten hurriedly, and saliva consequently not secreted in adequate amount, a twofold error is instituted. The food starches are not broken up and changed by the diastase into dextrin, etc. When the food is swallowed, the deficient quantity of saliva fails to stimulate the flow of gastric juice, for, like all weak alkalies, it is a powerful stimulant of that peptic fluid. The insufficient gastric juice fails to convert all the proteids into peptones, so that practically the great bulk of the starches, albuminoids, and fats are passed undigested into the intestines, where the pancreatic and intestinal fluids have to perform, unaided, the whole metamorphosis.

In robust health these secretions may be able to overtake this work, but when weakness leads to their scanty formation they fail, and, fermentation and putrefactive changes ensuing, still further complications follow.

Secretions deficient in Quantity.—Each of the digestive fluids may be secreted in too scanty amount. It will suffice to illustrate this by referring to the saliva and gastric juice only. They are scanty in febrile diseases, as well as in some affections of the nervous system.

Excessive in Quantity.—The saliva is increased in certain exhausted conditions. Sir William Roberts believes that pyrosis is merely a paroxysmal neurosis, which depends upon an acid condition of the stomach, causing copious gushes of saliva into the mouth. In certain catarrhal conditions of the stomach, *e.g.*, the alcoholic, saliva is formed in excess; it either dribbles on to the pillow, or is unconsciously swallowed during sleep. The gastric juice is frequently secreted in abnormal quantities, giving rise to acidity of the stomach. This appears to be particularly the case when the nervous system is faulty.

Morbid in Quality.—In fevers the saliva may be acid, and, in consequence, devoid of its diastastic power; this also may be the case in diabetes. The gastric juice occasionally contains abnormal proportions of hydrochloric acid and pepsin, or either too much or too little acid, the one condition delaying digestion as much as the other. In some feverish states it exercises no influence on digestion at all. Occasionally organic acids may be formed in the stomach: that of acetic fermentation will be immediately referred to; that arising from the fermentation of grape or cane sugars, starches or

milk, forming lactic acid, while that depending upon the rancidity of fat, forms butyric acid. Both these are instigated by the presence of organisms, and may, of themselves, cause catarrhal conditions to arise. Such acrid and disordered contents irritate the nerve endings and cause sensations inimical to sleep.

These fermentative changes lead to formations of large quantities of gas, which, prevented from escaping by the closed pyloric opening, sometimes lead to dilatation of the stomach.

Flatulence usually indicates slow digestion. Butyric acid causes heartburn by irritating the cardiac end of the gullet.

We shall require, hereafter, to refer to derangements of the biliary, pancreatic, and intestinal secretions.

Unsuitable Ingesta.—All food should have some proportionate relation to the age, temperament, and occupation of the individual, and to the weather and climate.

In the young, when growth and waste are equally rapid, and digestion is vigorous, much food is relatively required; in adult life, when growth is completed, and waste and repair alone need to be daily balanced, less food is necessary; in the aged, when repair is effected with difficulty, a yet smaller quantity of nourishment is wanted.

Men of sanguine temperament, usually possessing vigorous digestions, have occasion for more food than those belonging to the lymphatic or neurotic classes. The food of neurotics should always be carefully arranged, because, while they require to be nourished up to the limit of their digestive powers, if that be exceeded it causes derangements.

The physically active need more food than those who pursue sedentary occupations. A highland deer-stalker, trudging all day in invigorating air, can consume and digest food in quantity and quality utterly unsuited to a clerk spending the bulk of his life in an imperfectly oxygenated atmosphere. A man hunting five days a week can eat with impunity articles of diet he cannot digest at all while leading an inactive life in town. A lady can frequently digest better during the season when she is dancing for several hours almost every night, than when she is leading a less active life. In consequence, such persons sleep more soundly. Food should be modified according to the temperature of the weather, just as it re-

quires adaptation to different climates. The Briton has found by experience that he can only maintain his health when residing in extreme climates by adopting, in a large measure, the food of the country.

Overfeeding is a common source of Dyspepsia.—A man who habitually eats more than is required to compensate his mental and bodily waste—and it is a prevalent error—throws a tax upon his digestion. While he is vigorous, and his powers are in excess of his absolute requirements, it may not cause him any inconvenience, particularly as a certain proportion of the food evades digestion, and escapes with the fæces; but whenever anything occurs, such as overwork, to disturb or decrease his energies, digestion fails, and troubles begin.

If the food consists of a superabundance of albuminoids, it may not be all changed into true peptones, and these elements, putrefying in the stomach, give rise to eructations of sulphuretted hydrogen. Fats in excess retard digestion, and often give rise to butyric acid fermentation.

Unlimited quantities of fluid are injurious by diluting the gastric juice; very hot liquids, though at first stimulating, eventually enervate the mucous membrane. Iced fluids disturb digestion, by contracting the arterioles of the stomach, and by lowering the temperature below the point (98°–100° Fahr.) necessary for perfect digestion.

Dyspepsia in children, from eating rich and tempting food in excess, is a common source of sleeplessness.

Underfeeding.—Among the poorer classes indigestion is largely caused by the habitual use of tea and bread, which they consume abundantly on account of their cheapness; the temptation to do so being increased by the facts that tea is easily prepared, the appetite is appeased, and a feeling of well-being is sustained for a long time, evidently by its retarding digestion. These persons are practically semi-starved, as such a diet does not contain all the essentials necessary for the nourishment of the economy.

Among the richer classes it is not uncommon to meet with instances in which the amount of food is voluntarily limited. Afraid of growing stout, they curb their appetites, eat little or no luncheon, and take only a meagre dinner; and this habit tends to grow until a positive dislike to food occurs. Such men become dyspeptic and neurasthenic.

Men actively engaged in business often forget to eat luncheon; the accustomed hour passes and with it the appetite disappears. Ladies are culpable in this respect. All forms of slight starvation affect the nervous system, the enfeeblement of which leads to dyspepsia from defective innervation.

Children suffer occasionally from insufficient nourishment, chiefly from improper feeding, or from the milk they get being defective in quality. They grow restless, feverish, and sleepless, and cry unceasingly, the crying in many cases being suggestive of the cause of their discomfort; they are soothed and fall asleep when suitably fed. It seems probable that many infants have their sleep disturbed by lying on the left side after taking a full meal.

Unsuitable Food.—Food insufficiently and improperly cooked, as well as that difficult of solution, causes dyspepsia. The object of cooking is to develop the flavor, and render the foods acceptable to the senses of taste, smell, and sight, so that they may, through the agency of the mind, as well as reflexly through the mouth and palate, excite the flow of the various secretions; it also aims at changing the structure and composition of the food, so as to render it more easy of digestion. It has the disadvantage, in some instances, of tempting the person to eat too much; this is specially the case in those who lead luxurious and inactive lives.

Raw starch is exceedingly difficult to digest. Cooking bursts its cellulose capsules, swells up its contents, and exposes them to the action of the salivary ferment which transforms them into maltose. So with vegetable matters; they are swelled up and softened by boiling, and are thus more easily acted upon by the digestive fluids. The texture of animal food is changed by cooking, the connective tissue is softened, and its muscular fibres lose their cohesion; so that it can be triturated and minutely disintegrated by mastication, and prepared for gastric digestion.

Lumps of food bolted hurriedly arrest gastric secretion, and so may originate circulatory modifications which may induce wakefulness. The looseness of texture in meat is most marked after an animal is killed, before the after-death stiffening sets in; and secondly after it has been kept for some days. Every one can appreciate the difference in digestibility which distinguishes tender, juicy, and well-cooked beef from

that which is tough, stringy, and dry, though it may have been cooked with equal care. This difference depends upon the keeping.

Meat, poultry, and particularly game may be kept too long; after the textures are relaxed changes occur, which culminate in putrefaction. Such meats are poisonous. Cheese and many other articles of diet undergo decay and become noxious.

All badly-cooked meats are indigestible. The partaking of too many articles of food at one meal is a frequent source of trouble. A man may be able to eat and digest a full meal of bread and cheese, who would experience great discomfort from a mere morsel of cheese taken at the end of a large dinner. It is nevertheless probably true that the quantity taken has more to account for than the quality, if consumed in strict moderation. Many substances are indigestible and are better avoided, such as pastry and unripe fruit. Condiments and hot spices are injurious in excess. Stimulants taken to excess cause hyperæmia of the stomach with increased secretion of mucus. Sir William Roberts found that spirits in moderation did not retard digestion, but that sherry did so in a very marked way; port, claret, hock, and champagne also did this in an increasingly less degree in the order given; he found that Burton ale retards digestion, and also tea and coffee. Spirits and wine give rise to dyspepsia when taken in an injudicious quantity, or when many varieties are mixed. They not unfrequently produce acetous fermentation by the transformation of the alcohol into aldehyde after giving off some acetic acid.

Defective Arrangement of Meals.—Some people content themselves with two large meals daily, breakfast and dinner; eventually they find themselves unable to digest the latter. This arises from defective innervation of the processes and from deficient and defective secretions; their blood, the source of the secretions, being impoverished, fails to furnish the proper constituents. After a late and large meal their condition is one of exhaustion combined with a surfeit of food, which is fatal to sleep. When the last meal is taken too long before going to bed it often causes sleeplessness from want, though there may be no sensation of hunger. Frequently repeated meals are quite as injurious as too infrequent.

Each full meal requires four or five hours for its complete digestion; to crowd in food, in the intervals, is to disturb and render incomplete the digestive processes. Taken for the purpose of building up strength, it defeats its object and becomes a source of weakness. In health, all fillips between meals are best eschewed. It must be added that in many diseases, as inflammations, fevers, etc., improper feeding gives rise to deranged digestion; and this is of importance in this inquiry, as the sleeplessness which so frequently attends these ailments is more commonly due to dyspepsia than is supposed, and this form of sleeplessness only yields to the treatment of what may be designated the subsidiary disorder. An overloaded stomach in such cases completely prevents sleep, until vomiting relieves it of its burden.

Idiosyncrasies.—Many cases of dypspesia arise in persons from eating articles of food, not ordinarily difficult of digestion, but to which, from some peculiarity in their constitution, they are intolerant. Many seem to be unable to digest fat, milk, eggs, cheese, shellfish, mackerel, onions, and such like common dietetic articles, and if perchance they partake of them it is at the cost of sleep. The majority of persons who exhibit such idiosyncrasies are either neurotic or gouty. They suffer most in advancing years. They display a like intolerance to the use of many drugs, so that their medication is rendered difficult.

Having thus touched upon some of the causes of disordered digestion, a passing reference must be made, from a diagnostic standpoint, to a few of the symptoms which usually characterize the recognized forms of gastric derangement.

Symptoms of Dyspepsia.—The tongue is large, teeth-indented, sodden, and covered by a white fur in derangements arising from atonic conditions of the system; it is clean and frothy in neurasthenic states. It is foul and thickly furred, with red tip and prominent papillæ, and associated with redness of the gums and throat and dryness of the lips, in catarrhal affections of the stomach. When the catarrh has arisen from alcoholic excess, the tongue trembles on being protruded. It is clean, red, and glazy in certain cases of irritative dyspepsia; and coated with a blankety fur when derangement depends upon excessive smoking.

The breath is offensive in catarrhal conditions, and more

or less heavy in all derangements, the mouth having, in many cases, a clammy disagreeable taste in the morning.

The appetite is increased in neurasthenic dyspepsia to such an extent as to amount, in some cases, to a craving for food, which eating and drinking temporarily alleviate.

It may be increased in certain catarrhal states, in which there is usually a preference for highly-seasoned dishes and savories, thirst being very marked. It is often fairly good in atonic dyspepsia, but thirst is uncommon. It is decreased in acute gastric catarrh, and in derangements depending upon diminished secretions; while it is perverted in hysteria, pregnancy, etc., arising either from central or peripheral irritation.

Epigastric discomfort, depending upon the accumulation of gas in the stomach, and amounting to a sensation of distention and oppression, is common in atonic dyspepsia, when the muscular movements of the viscus are sluggish, two or three hours after meals. It may be so marked as to require the clothes to be loosened for its relief; occurring during the night, it leads to sleep disturbance. The nature of the eructations, voluntary or involuntary, affords a guide to the fermentative process; the gas may be tasteless, simply carbonic acid, or sour, when the contents of the stomach are acid, etc.

Acidity combined with flatulence is an indication of slow digestion. The acidity may arise from an excessive secretion of gastric juice, or from the formation of an abnormal acid.

Pain ranges from mere discomfort, which is seldom wanting in any case, up to severe excruciating pain. It is most severe in the neurosal complaints, and in central affections, such as hypochondriasis. The pain, in acute catarrhal ailments, is variable, but it can always be elicited by pressure. In chronic gastric catarrh it may amount only to uneasiness, and be temporarily relieved by eating and drinking. Pain from ulceration comes on quickly after food is taken; from chronic atonic dyspepsia, in two or three hours, being mostly associated with defective secretions. In functional disorders it is not aggravated by food; when it comes on during the night it is usually from arrested or irregular muscular movements, and from distention with flatulence. Pain referred to the stomach is not always due to derangements of digestion.

Vomiting occurs in acute gastric catarrh shortly after eating, and is preceded by nausea; in chronic catarrh it is

common in the morning, as it is in the reflex irritation of pregnancy. It occurs in ulceration almost immediately after taking food, and in slow digestion after the lapse of two or three hours; in dilatations and in pyloric obstruction at distant intervals and in excessive quantities. The vomited matters should always be scanned for mucus, abnormal ferments, *sarcinæ ventriculi*, bile and blood. In affections where bile regurgitates into the stomach, it destroys digestion by rendering the acid contents alkaline, and it stains the vomited matters green.

The bowels are often loose in catarrhal, and constipated in atonic and neurasthenic conditions.

The general symptoms vary; restlessness, irritability, and headache being associated with gastric catarrh, while languor and despondency, increased after eating and accompanied by a tendency to flush, are the concomitants of atonic derangements.

The complexion is often muddy, the skin is dry and harsh, sometimes flabby and greasy, or affected by eczema or other form of skin disease. The hands and feet are, in many instances, cold and chilly during the day, and hot and burning at night. Cardiac and respiratory disturbances take the form of palpitation, intermission, and irregularity of the heart's action; and of cough and asthmatic seizures, which are most apt to come on at night during sleep. The urine may be acid and scanty, containing uric acid, urates or phosphates in excess, oxalate of lime crystals, or traces of albumin and sugar, the latter commonly from improper ingesta.

Hiccough, eructations, heartburn, acidity, burning sensations in the hands and feet, are all able to prevent sleep; while flatulent distention of the stomach and bowels, by embarrassing the action of the diaphragm, and mechanically impeding the movements of the lungs and heart, may disturb sleep, and cause dreams, nightmare, or sleep-walking. Painful sensations are likewise inimical to sleep.

Thus the forms and symptoms of digestive derangements which give rise to insomnia are numerous. In many instances no difficulty exists in the diagnosis, but in others it is not so. It then requires persevering investigation to deduce its genesis, and it is sometimes surprising how little assistance is derived from the patient or his history. Seeking advice for

sleep disturbance of long duration, he may affirm that his digestion is perfect, and repudiate, even indignantly, any suggestion to the contrary; and yet upon pushing the inquiry a confession is elicited that for some years he has been slightly languid, prone to flush, and somewhat flatulent after eating, and not hungry in the morning. Directing treatment to these symptoms the insomnia disappears.

When indigestion can, in waking moments, cause such circulatory derangements as to lead to pronounced flushing, it is not surprising that during sleep it can set up cerebral hyperæmia.

Treatment.—The treatment of dyspepsia must necessarily vary with the cause. As digestive derangement is frequently a local indication of some departure from health, rather than a primary affection, the treatment requires to be conducted, in the majority of instances, on general as well as on special principles.

Everything which tends to strengthen and impart tone to the nervous system, and to improve the chemical metamorphoses of the formation and depuration of the blood, ameliorates the symptoms. It is certainly the right way to begin the treatment; but whatever course may be adopted the following rules apply to all cases.

It is essentially necessary that all dyspeptics should eat slowly and deliberately. The masticatory movements not only increase the pulse rate and the flow of blood to the secretory glands, thus inciting the active formation of the juices, but they incorporate the starches with the saliva, and disintegrate the albuminoid foods to prepare them for further digestion. Everything, therefore, which prevents complete mastication should be remedied, and the gums and teeth kept in good working order. It is important to eat in moderation; the majority of people probably eat too much. Eating slowly is practically equivalent to eating less, for the appetite is appeased by a smaller quantity, while that taken is more thoroughly digested and assimilated. The food of every-day life should be arranged so as to embrace suitable and proportionate quantities of nitrogenous, carbonaceous, saccharine, and oleaginous elements; and these (as has been already pointed out) should bear some relation to the age, temperament, occupation, etc., of the individual, and to the strength

of his digestive powers. Morevover, the food ought to be varied from day to day. This promotes digestion and assimilation in a very marked way. Many errors are committed in this respect. As an example, the writer may mention the case of a lady of advanced age, who consulted him some years ago for serious sleep disturbance dependent on a skin affection; on inquiry he found that for a few years she had dined every day upon salt-fish pie. In such a case the wonder was, not that she was suffering, but that she kept so long free from disease.

The dietary, then, must be carefully considered in every case, so that the patient may be told distinctly what to eat and what to avoid. As a rule, liquids should be taken at the end of meals only. Meals should be fixed at regular intervals, the last being taken not earlier than three hours before bedtime, and composed of digestible articles.

Good cooking is of paramount importance. It is useless to prescribe a special diet if it is badly prepared. If, for example, a sole (which is delicate and light) is cooked in lukewarm oil, so as to be thoroughly saturated with grease, it is rendered most obnoxious. Roasting, broiling, and grilling are the best forms of preparation, but these require the cook's art. Boiling and stewing come next. Frying and hashing are to be avoided as unsuitable. Dyspeptics should never eat recooked meat.

Fresh meat should be well kept, and the lighter and more digestible varieties preferred. Well cooked and pleasantly flavored, it stimulates the flow of the salivary and gastric juices, which in their turn influence the gastric movements, for the muscular activity is in ratio to the acidity of the contents of the viscus. Lemon juice with fish and the judicious use of condiments have advantages. The most easily digested fishes and vegetables should be selected. Mutton, poultry, and game are the most admissible meats. Fats and fatty meats and fishes are best eschewed, especially when they are hot; and also veal, pork, and hard salted meats. Clear soups in moderation rather aid than hinder digestion; in other instances, all liquids increase discomfort. Vegetables and starches should be thoroughly cooked; stale bread, toast and biscuit crumble easily, and are therefore to be chosen. New bread is very obnoxious. Potatoes should be eaten sparingly.

Boiled milk diluted with water, lime water, or peptonized, has a large field of usefulness. Koumiss is excellent, and can easily be prepared at home.

Spirits, wines, and malt liquors, if they seem to promote digestion, may be allowed, but these require consideration in each case. A small quantity of whiskey or brandy in an alkaline effervescing water toward the end of a meal is frequently a distinct aid to digestion, particularly when cold extremities and drowsiness result from eating. Claret and champagne in other cases suit better. When prescribed it must be in quantities far short of that which could induce gastric catarrh.

Many dyspeptics get into a bad habit of eschewing every article of diet which causes them inconvenience; this must be discouraged. Eating "down" seldom answers.

All severe muscular exercise or mental work immediately before or after eating is undesirable, and is certainly incompatible with good digestion.

The Turkish bath taken twice or thrice a week at suitable hours is most useful. The effects of dyspepsia on the integument are so marked that in most cases an unusual amount of epidermis peels off in the process of shampooing. A morning bath regulated to the strength of the patient, and sea-bathing, show their influence upon the appetite and digestive powers, and therefore are to be recommended.

Exercise short of fatigue is an exceedingly valuable adjunct to treatment; in every case it must be proportionate to the patient's stamina. The use of dumb-bells or clubs after the morning bath is advantageous, quickening as it does the circulation of the blood through the whole muscular system, and toning the abdominal muscles, by which the processes of digestion are invigorated. These processes are still more braced by exercise in the open air; that follows necessarily from the recuperation of the nervous and circulatory systems which is brought about. Walking and cycling, tennis and golf, shooting and fishing, are usually useful in different cases, but riding is par excellence the most healthful form of exercise. Lord Palmerston happily put it, "that the outside of a horse was the best thing for the inside of a man."

Change of air and scene is sometimes called for. Digestion and nutrition being accomplished more easily and perfectly on dry porous soils, an improvement takes place which

permits of amended sleep; this is specially true of dry elevated places. For such patients, there are many suitable climates in Britain and abroad, but in advising change the peculiarities of each case must be specially considered with reference to the particular resort. Change of air being the most expensive remedy that can be prescribed, care is requisite for its precise recommendation.

In addition to the general regimen and dieting it is often necessary to treat symptoms.

Flatulence, with sensations of oppression and distention in the epigastrium, and often accompanied by eructations, was deemed by the late Dr. Leared to depend upon impaired muscular movements of the stomach and bowels, consequent upon enervation. This is the reason that the enfeebled, the anæmic, and the neurasthenic are so often afflicted with flatulence.

Eructations of Gas.—When these occur the nature of the gas affords indications for suitable treatment. When they are acid, the starches and sugars, which are easily changed into lactic acid, should be limited; when they are acrid and oily, the fats must be diminished in quantity; when composed of sulphuretted hydrogen, the albuminoids ought to be curtailed; when they are tasteless, and caused by eating unripe fruit, badly-cooked vegetables, or by the use of peas or beans, these obnoxious articles should be avoided. Remedies which will give tone to the nervous centres, and increase the acidity of the chyme, are valuable. Weak alkalies with strychnine are usually the most efficacious.

℞ Bicarb. potass., ... ʒ iij.
Tinct. nucis vom., ... ʒ ij.
Tinct. cardam. co., ... ʒ vi.
Aquam, ... ad ℥ vi.

M. Sig. Take a tablespoonful in water, before meals, thrice daily.

An acid given after meals attains the same object, particularly if it be combined with pepsin. The following pill suits well:

℞ Sulph. quinin.,
Acid. carbolic. crys.,
Ext. nucis vom., ... āā gr. ss.
Pepsin. porci, ... gr. iiss.

Ft. pil. i. Sig. One before meals at which meat is taken.

For immediate relief from distention, charcoal in capsules, naphthalin in doses varying from gr. v. to gr. x., or sodium sulpho-carbolate, gr. x. to gr. xv., are all effective.

The bowels in all cases should be carefully attended to, and when necessary acted upon by means of aperients, such as rhubarb, infusion of senna pods, or cascara sagrada.

Acidity may depend primarily upon excessive, scanty, or disordered secretion of the gastric juice. An acid, such as dilute nitric acid, or the oxide of silver, given before meals, acts as an astringent. When the acidity depends upon the formation of an abnormal acid, the starches, sugars, and fats must be carefully and judiciously managed, and tea and coffee must be sparingly taken. Washing out the stomach by means of emetics and copious draughts of warm water every night for three or four nights is an efficacious method of ridding the stomach of abnormal ferments. It is marvellous to witness the improvement that follows. The last three patients to whom the writer prescribed this treatment improved at once, and gained considerably in weight. The first gained twenty-two and a half pounds in three months; the second, eight and a half pounds in a month; and the third, six and a half pounds in the same time; in each instance they were sleeping soundly and well when they passed out of observation. For immediate relief:

℞ Acid. carbolic. crys., ... gr. xij.
Liq. bismuth., ... ʒ x.
Glycer., ... ʒ vi.
Aquam, ... ad ℥ vi.
M. Sig. Take a tablespoonful, in water, for a dose.

Or,

℞ Carb. bismuth., ... gr. x.
Bicarb. sodii, ... gr. vi.
Pulv. aromat. co. . . . . gr. iij.
Ft. pulv. i. M. Sig. Take one for a dose.

Spanish juice is a serviceable, if homely, antidote. It is specially useful when the secretions are perverted, and its efficacy is enhanced by sipping hot water. Widely different opinions have been expressed as to the action of this remedy, some believing that it relieved solely by stimulating an increased flow

of alkaline saliva, which being swallowed, neutralized the acid contents of the stomach; while others have pointed out that if that were its only *modus operandi* cane sugar would act equally well. Dr. George Keith, who advises its use as a hypnotic, points out that, as a matter of observation, although cane sugar may in this way temporarily relieve, the acidity is speedily aggravated; which never occurs after liquorice. Spanish juice seems also to exert a soothing influence over the mucous membrane of the stomach, as the liquid extract of liquorice likewise does in a lesser degree (see below). Whatever may be its precise mode of action, its usefulness in a large number of cases is undoubted. It is most conveniently prescribed in the form of Pontefract cakes.

Pain.—When it is neurosal, arsenic with belladonna should be prescribed. A case lately under treatment exemplifies a usual experience. A lady, sleepless for months, came suffering from severe and persistent gastric pain with considerable emaciation; she had lost nearly two stones in weight. One dose of morphine and atropine having been taken at night, which secured a sound sleep, she was advised to take a mixture of arsenic and belladonna; when forthwith she lost her pain, regained sleep, and made an excellent recovery.

When it depends, as it frequently does, upon scanty secretions, weak alkalies before meals, and pepsin after, answer well. Where the peripheral endings of the gastric nerves are irritable, small doses of morphine, dilute hydrocyanic acid, and bismuth are called for. In anæmic cases the following is an excellent formula:

℞	Liq. bismuth., ...	℥ i.
	Cit. ferri ammon., ...	℈ ij.
	Acid. hydrocyan. dil., ...	♏ xvi.
	Ext. glycyrrh. liq., ...	ʒ ss.
	Spt. chlorof., ...	♏ viij.

M. Sig. Take a teaspoonful in water, thrice daily, before meals.

The liquorice extract was originally introduced to modify the disagreeable taste, but it added to the efficacy of the mixture.

Pain, awaking the patient at night, must be relieved by opiates, antispasmodics, and poultices.

Vomiting of frequent recurrence requires treatment. It is sometimes arrested by counter-irritation and simplifying the food; restricting it to ice, iced champagne, milk and lime water, or koumiss. Among the most suitable remedies may be mentioned minim doses of ipecacuanha wine, dilute hydrocyanic acid with calumba, cerium oxalate, bismuth carbonate, magnesium salicylate, or the hypodermic injection of morphine. Cocaine is sometimes useful. Rest in bed is always essential in obstinate cases.

Hiccough usually yields to a mustard plaster externally and an alkaline mixture internally. When these fail, ♏ v. of chloroform on a knob of sugar, or a hypodermic injection of morphine must be given.

Pyrosis.—The writer has almost never required to use any other medicine than ferro-alumen in 3-grain doses, with ♏ ij. of dilute hydrocyanic acid; and he has seldom been disappointed with the results.

Regurgitation of Food.—This is relieved by arsenic (♏ ij. to ♏ iij. of Fowler's solution) before meals; likewise by the following pill:

℞	Ext. belladon., ...	gr. ⅓
	Sulph. quinin., ...	gr. i.
	Ext. hyoscy., ...	gr. ij.

Ft. pil. i. Sig. Take one three times a day, an hour after meals.

The urine in many cases yields indications for treatment.

Sleep usually returns with the relief of the derangement; it is, however, occasionally useful to administer some special remedy for a few nights to induce sleep, and so gain the benefit of its powerful recuperative influence. Dr. George Keith advocated the use of Spanish juice at bedtime as an aid to sleep, and that in cases in which no disorder of the gastric secretions existed. From six to twelve Pontefract cakes is the usual dose. The writer has repeatedly obtained good effects from their use, while they act as a slight aperient. In some instances the benefit derived was so striking that the patients asserted they must contain some opiate. In a variety of cases they are of undoubted efficacy. Here is also a good and unobjectionable draught:

℞ Bicarb. potass., ... gr. xv.
Tinct. lupul., ... ʒ i.
Tinct. lavand. co., ... ʒ ss.
Infus. anthem., ... ad ℥ ij.
M. Sig. Take at bedtime.

Nutmeg too is useful. Spiritus myristicæ ʒ ss., in an ounce or two of peppermint water, acts in a similar manner. Nutmeg has for centuries been credited with possessing hypnotic properties, and not without some good reason. The late Dr. Cullen, however, thought it should not be prescribed in the case of persons with a tendency to apoplexy.

Among the more potent agents suitable, may be mentioned hyoscyamus, cannabis indica, morphine, codeine, belladonna, etc.; and among the less active (although of undoubted value) camphor, valerian, the oil of chamomile flowers, etc. It must be borne in mind that the treatment must be directed to the alleviation of the disorder which originates the disturbing sensations, and to the lessening of the conductivity of the sensory nerves. Pure hypnotics are useless for such purposes.

Intestinal Dyspepsia.

In the last section we discussed derangements chiefly connected with gastric or acid digestion; we have now to consider some which are associated with intestinal or alkaline digestion. This process is carried on by means of the bile and the pancreatic and intestinal juices.

The bile furthers intestinal digestion in several important respects; the following are the chief. It is expelled from the gall-bladder when the acid chyme enters the duodenum, and it precipitates the pepsin and any of the proteids which have only been transformed into acid albumin, instead of into true peptones, and in that way prepares them for the subsequent action of the pancreatic and intestinal juices. It possesses feeble diastatic properties which act on the unchanged starches. It emulsifies some of the neutral fats, and aids in their absorption, as fats pass through bile-moistened membranes with some facility. It acts as a powerful antiseptic, and excites the muscular contractions of the intestines. It is thus evident that any disease interfering with the formation of bile must

not only induce disorders of intestinal digestion, but lead to mal-assimilation.

The pancreatic juice, which is strongly alkaline, contains three important constituents, which combine the properties of the saliva and the gastric juice. These are, amylopsin, trypsin, and steopsin. The first acts on the unchanged starches, and changes them into dextrin and sugar; the second breaks up the proteids, and converts them into peptones; while the third saponifies and emulsifies fats. The processes are largely promoted by the intestinal movements. The intestinal juices contain similar properties. Absorption goes on in the intestines through the agency of the blood-vessels and the lacteals.

The sources of intestinal dyspepsia are really the same as those enumerated as inducing gastric disorders: Defective structures; defective innervation; defective vascularization; faulty secretions; faulty ingesta.

The most common exciting causes are imperfect salivary and gastric digestion, leaving the bulk of the chemical changes to be effected by the pancreatic and intestinal juices. In persons of limited digestive energy these are insufficient to accomplish this completely; hence, fermentative and putrefactive changes occur which render the contents of the colon acid, and the leucin and tyrosin may be converted into indol and skatol, substances from which the fæces derive their odor.

It may be occasioned by a too scanty formation of bile; or, what is practically the same, an excessive acidity of the chyme, neutralizing the alkaline constituents of the bile and pancreatic fluids, and so terminating the alkaline processes. It is frequently excited by defective muscular movements.

The symptoms of intestinal indigestion may be conspicuous by their absence; when they do occur they differ from those of gastric origin. They come on some hours after meals, the sensations being referred to the right hypochondrium and umbilical regions, rather than to the epigastric. The tongue is coated with a thick yellowish fur; the breath is usually heavy, and the appetite impaired or fitful. There may be flatulence in the bowels (borborygmus), often in very considerable amount, the weakened intestinal walls admitting of great distention.

This accumulation of gas is due to the decomposition of the various aliments, and the gases being absorbed into the

blood leads, in some cases, to severe general disturbance—even to collapse. Pain is usually of a griping or spasmodic nature, and yields to heat and pressure. Arising during the night, it is frequently due to arrested muscular movements. There may be nausea and vomiting from reflex irritation, the latter being ineffectual, and not attended by the relief that follows the vomiting in gastric disturbance.

The bowels are sometimes relaxed, but generally they are constipated, the motions being pale, dry, and offensive; and if the pancreatic secretions be faulty, fat may be detected in them.

The urine is scanty, high-colored, and either deposits uric acid or urates on cooling.

The aspect is sallow and earthy, the conjunctivæ tinged with yellow pigment. These patients look ill, they are depressed and desponding, and at times hypochondriacal. Giddiness and disorders of the special senses are common. There is often much emaciation, the nervous system feeling acutely the non-absorption of fats, etc.; and as absorption of these nutrients takes place in the upper half of the intestinal canal all derangements of digestion in that portion lead to enfeeblement and enervation of the whole body. The heart and lungs participate in this weakness. The blood badly formed, and laden with waste products nourishing the tissues inadequately, adds to the prostration. Such persons are apt to be shivery and miserable.

The cerebral cells, partially starved, grow susceptive, and responsive to slight stimulations; this they show at night in sleeplessness and restlessness, the latter of an almost exaggerated kind, compelling the patient to get out of bed and wander up and down his room. So marked is this, that the writer, for many years, has believed the pathogeny of fidgets to be reflex irritation excited by duodenal and intestinal disorder.

Intestinal dyspepsia is a much more frequent source of sleep disturbance than the gastric form, and one of greater diagnostic obscurity, for the reason that there may be no symptom to indicate abdominal discomfort; in short, no symptom other than obstinate wakefulness. Intestinal digestion, which is not normally completed for some hours after the ingestion of a full meal, is even more slowly effected in such

patients. If sleep supervene, and the intestinal movements slacken or cease, the processes are interrupted, and so derangements are initiated which disturb and terminate sleep.

Many patients who awake at one or two o'clock in the morning, and lie awake till five o'clock, are roused by intestinal disturbance, and are kept from sleeping until the movements complete the digestive processes. Moreover, the persistence of imperfect intestinal digestion, leading to defective nutrition, renders the cerebral cells abnormally sensitive to all disturbing agencies in the economy. They are thus perturbed by insignificant distant sensations, which in robust health they would not perceive.

Treatment.—All that was said upon the treatment of the general condition in gastric disorders applies here, exercise being probably more called for, by quickening the circulation it facilitates the chyle currents. Turkish baths are particularly beneficial. Every means calculated to improve innervation and vascularization should be adopted.

Intestinal digestion is not easily impressed by medication; practically it can only be improved by rendering salivary and gastric digestion more complete. Where excessive acidity of the gastric contents exists, it should be neutralized with lime water, lithium, or magnesia. When diarrhœa is present, opium must be given. Constipation must be relieved. When the pancreatic fluid is deficient some temporary benefit may be derived from the use of Benger's pancreatic liquor in lime water, or mixed with sodium bicarbonate two hours after meals; and also from the judicious administration of malt extract. Sleep is often improved by the nightly use of massage, and also by the application of an abdominal compress.

Heat, stimulating the completion of the digestive processes, favors the return of sleep. For example, a bag containing hot water applied over the abdomen, and a drink of warm water on awaking, seldom fails to act beneficially.

When flatulence is a marked symptom, the administration of turpentine is desirable. That drug possesses, in addition to its powerful carminative, some hypnotic properties. The late Dr. Warburton Begbie recorded: "Occasionally the oil has been observed to cause sleep."

Wakefulness is frequently obviated by a draught like the following at bedtime.

℞ Bicarb. potass., ... gr. xv.
Sulph. sodii, ... ℥ i.
Tinct. lupul., ... ℥ i.
Infus. anthem., ... ad ℥ ij.
M. Sig. Take at bedtime.

In other cases a similar draught, in which ♏ x. of the tincture of belladonna is substituted for the sodium sulphate, suits even better; and a little syrup of ginger may be added to either. Such draughts, taken during the night on awaking, often induce sleep.

When sleep is urgently required it is sometimes useful to administer a hypnotic for a few nights to allow the nervous system to recuperate; but as they are obviously not curative agents, their use must be dispensed with if possible. Hyoscyamus, tannate of cannabin, and lupulin are the most suitable hypnotics.

Constipation.

The contents of the small intestines are liquid. As that portion of the alimentary tract secretes digestive fluids abundantly, these compensate for the withdrawal of the nutrient constituents, which are rapidly absorbed. The processes of secretion and absorption are therefore here balanced. The contents of the large intestine are more consistent, and if they are retained for any length of time they become dry and hard, for in the large intestine secretion is limited, while absorption is considerable. The powers of absorption are well demonstrated by the rapid way that the rectum appropriates liquid given by enemata. (See page 659.) The consistency of the contents of the colon is thus the result of time, for if they are rapidly passed from above downward, as they are in diarrhœa and after the administration of saline purgatives, the motions are quite liquid.

Among the causes of constipation must be enumerated:

Defective structures, which comprise all lesions interfering with the integrity of the intestines. The graver diseases include deep ulcerations and cancerous growths; the more trivial, hemorrhoids and fissure of anus. Those external to the bowel comprise tumors and displacements of the womb, etc., occluding the lumen.

Impaired nervous arrangements, central or peripheral.

Mental depression and organic cerebral diseases frequently induce obstinate constipation. Neurasthenic conditions and the use of some poisons in excess, lead to the enervation of the whole processes of digestion, and to a relaxed state of the muscular system, with defective movements. It is very common to meet with constipation in men and women of slothful habits, who spend their days in heated and badly-ventilated rooms, and who take no exercise. It depends mainly upon an enervated condition of the muscles involved in digestion, viz., the abdominal, and the intestinal, and the diaphragm. This relaxed state is the source of constipation in many aged persons. The habitual neglect of the calls of nature (which is a common source of constipation) brings about a condition in which the nerves fail after a time to respond to their normal stimuli. Indeed, any interference with the integrity of the nerves supplying the rectum and anus, may cause constipation by destroying the usual reflex arrangements. The want of sleep, though mentioned thus late, is a far more frequent source of constipation than is generally imagined. It is thus the cause of, as well as the result of, constipation.

Abnormal vascularization: this chiefly depends on anæmia and imperfectly oxygenated and deterged blood, and on diseases which retard the free return of blood to the heart, such as obstruction of the portal circulation. It may also depend on the presence of poisons, as lead.

Faulty chemical changes, such as arise from defective secretions, as occur in some fevers and debilitating diseases, or when the system is drained of excessive quantities of fluid, as in diabetes, over-lactation, etc.

Faulty ingesta: this includes food too astringent, or too bland in character, *e.g.*, when large quantities of tea, red wines, and starches are consumed.

The effects of constipation are very varied. The absorption of gases formed by the fermentative and putrefactive changes in the fæces causes headache, vertigo, disorders of vision and hearing, feelings of lassitude, and, in many instances, profound depression and gloom. Such patients are tormented by constant forebodings of ill; their aspect is dejected, complexion muddy, tongue furred, breath heavy, appetite and digestion bad; and they are often neuralgic.

If the fæces are allowed to accumulate for weeks or even months, the noxious materials absorbed by the blood cause very pronounced symptoms, chiefly referred to the nervous centres. There is generally, although not necessarily, an increase of temperature; quick pulse, at times irregular; persistent vomiting; emaciation and prostration. There may be cough, palpitation, and liquid diarrhœa; in short, many of the symptoms resembling those of enteric fever. In all cases sleep is interfered with, dreams and nightmare being concomitants of the milder cases.

The chief causes of disturbed sleep are increased arterial tension and hyperæmia of the brain. This is brought about mainly through the centres in the medulla, and activity is thus maintained in the cerebral cells. The implication of the medullary centres is well seen in the night sweats which so frequently occur in these cases.

In children constipation gives rise to very marked disturbance. During the day they are peevish, irritable, and easily tired, suffer from colicky pains in the abdomen, which cause them to cry, often to shriek with pain, this being associated with flatulent distention. Periodic crying in children is invariably suggestive of intestinal derangement. The bowels, in some cases, act daily, but the quantity passed is insufficient. They eat fitfully and digest badly, look pale and sallow, and lose flesh quickly. At night they sleep badly and may be feverish; they wake up screaming as if in pain, but they are not confused as in night-terrors. They dream and are restless, in the morning are tired and weary.

Treatment.—Sleeplessness from this cause yields only to the removal of the constipation; a purgative will, in a child, often suffice to render sleep calm and healthful.

It is important to cultivate the habit of unloading the bowel daily at a regular hour. All errors in the ingesta must be remedied, and a regimen something like the following adopted. Fruit should be eaten every morning when dressing. Ripe fruit in season, oranges in winter, or French plums or figs, soaked the evening before in a saucerful of cold water. After the fruit, a claret glassful of hot water may be slowly sipped. Whole flour bread should be preferred to white; oatmeal porridge with treacle or cream is useful at breakfast. Green vegetables and fruit should be liberally used at luncheon

and dinner. Red wines, beer, brandy, tea, milk, eggs, cheese, nuts, pastry and farinacious milky puddings should be avoided. A large glassful of hot water should be sipped at bedtime.

When the defect is due to enervation, hot compresses applied over the abdomen are often useful by exciting intestinal movements. Electricity, either the galvanic or faradic currents should be tried when the muscular movements are weak. Baths of various kind should be employed, followed by vigorous flesh-brushing. Exercise in the open air short of fatigue should be taken. Horse exercise is the best.

Until these hygienic measures have time to act, it is usually necessary to prescribe some laxative. Various mineral waters taken in the morning fasting are useful, and may be continued for some time. Probably the best are Friedrichshall, Hunyadi Janos, Æsculap, and Rubinat-Condal. They should be taken mixed with hot water, and sipped slowly.

What answers equally well, and in some cases better, being less depressing in its action, is an infusion of senna pods. It is one of the mildest and most reliable evacuants we possess. It acts as a tonic, cleaning the tongue, promoting the appetite and digestion, and increasing the muscular movements of the whole alimentary tract. It does not cause griping, flatulence, or congestion of the pelvic vessels like that made from senna leaves. From six to twelve pods, or, more, should be infused in a claret glassful of cold water for six hours, and the infusion taken at bedtime. It is devoid of disagreeable smell and taste.

The following mixture and pills have been found useful:

℞	Tinct. nucis vom.,	ʒ ij.
	Acid. nit. dil.,	ʒ ij.
	Ext. cascar. sag.,	fl. ʒ iij.
	Infus. gentian.,	ad ℥ vi.

M. Sig. Take a tablespoonful in water after meals twice or thrice daily.

℞	Aloin.,	gr. i.
	Ferri sulph.,	gr. i.
	Ext. nucis vom.,	gr. ss.
	Pulv. myrrh.,	gr. iss.
	Ext. hyos.,	gr. i.

Ft. pil. i. Sig. Take at dinner time.

Or, if iron be contra-indicated,

℞	Ext. aloes soc.,	gr. iss.
	Ext. nucis vom.,	gr. ss.
	Sulph. quin.,	gr. i.
	Pulv. capsic.,	gr. i.
	Ext. gentian.,	q. s.

Ft. pil. i. Sig. Take one before dinner.

When the secretions are defective, one or other of the following will be found serviceable:

℞	Res. podoph.,	gr. ¼.
	Ext. bellad.,	gr. ⅛.
	Pulv. ipecac.,	gr. ss.
	Fel. bov. inspis.,	gr. ij.

Ft. pil. i. Sig. Take one in the evening.

Or,

℞	Aloin.,	gr. i.
	Ext. nucis vom.,	gr. ss.
	Pil. hydrarg.,	gr. i.
	Pulv. ipecac.,	gr. ss.
	Fel. bov. inspis.,	gr. ij.

Ft. pil. i. Sig. Take after dinner.

In all cases of disturbed sleep due to constipation, hyoscyamus is a most useful remedy, for besides acting as a hypnotic in medium doses, it augments the peristaltic movements of the intestines.

When there is any tendency to bleeding piles, this powder is a reliable laxative.

R	Sulphur. precip.,	
	Pulv. cubeb.,	āā ℥ i.
	Pulv. guaiac.,	ʒ ij.
	Pulv. pip. nig.,	℥ i.

M. ft. pulv. Sig. A teaspconful in water, night and morning.

In cases in which the administration of purgatives appears to still further disturb sleep, as in some neurasthenic and hypochondriacal states, from two or six minims of the oil of chamomile flowers alleviates the hyper-sensitivity.

In children, sodium phosphate in unsalted soup is a pleasant if an old-fashioned laxative. Here also is a good and useful prescription. Take of figs, as new and soft as they can be

got, ℥ viij., powdered Alexandrian senna, ℥ i., treacle ʒ ij. Cut the hard ends off the figs, then cut them into shreds, add the senna and treacle, and beat the whole into a pulp. It is pleasant to taste, and the dose is a piece about the size of a hazelnut.

Sleep may likewise be disturbed by catarrhal and inflammatory affections of the gastro-intestinal canal, as in diarrhœa and dysentery, either acute or chronic. The treatment is obviously that of the disease. This remark is equally true of the wakefulness of collapse, the result of perforation; as also that which occasionally accompanies peritonitis; and the wakefulness which is said to attend cholera morbus.

Intestinal Worms.

(Tænia solium; Ascaris lumbricoides; Oxyuris vermicularis.)

Although these differ very greatly from one another, the symptoms they instigate in the nervous and alimentary systems are so much alike that it is convenient to discuss them together.

They may be present without giving rise to any symptoms at all; or they may reflexly give rise to diseases of the nervous system, such as chorea, etc. They invariably cause digestive and nutritive derangements; frequently sleep disturbance and dreams; and occasionally they may excite nightmare, night terrors, and somnambulism. Grinding the teeth is a common symptom, and if it be not due to gout, which is rarely the case in children, it should always suggest worms. This source of sleeplessness must not be overlooked, as an anthelmintic is the only hypnotic. Worms occcasionally cause extreme irritability of the bladder.

The general symptoms are capricious or perverted appetite, pain and uneasiness in the abdomen, itching of the nose and anus, malaise associated with restlessness, headache, mental depression, noises in the ears, etc. The amount of sleeplessness and emaciation that threadworms sometimes cause in adults is very great indeed. In children, the reflex irritation which worms excite in the bladder is occasionally so great as to suggest disease in the urinary organs. This may disturb sleep.

Treatment.—This consists, of course, in the expulsion of the worms.

CHAPTER X.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE LIVER.

Functional Disorders of the Liver.

The liver exerts an important influence upon the digestive processes as well as upon nutrition. Its functions are manifold. It forms bile in quantities bearing a distinct relation to the ingesta; a large quantity being secreted when the food is highly nitrogenous, and a smaller amount when it is oleaginous. The liver also is instrumental in the construction of glycogen, and in its accumulation until its consumption is required in the economy. It is the organ which presides over the transformation of a certain proportion of the nitrogenous products into blood-corpuscles, and also of the disintegration of effete blood-corpuscles; it is concerned also in the formation of urea.

Dr. Lauder Brunton credits the liver with the power of destroying certain poisons, and of preventing their entrance into the circulation in deleterious quantities.

In the course of the metamorphosis of the proteids into peptones (especially in the later stages), in the small intestines, leucin and tyrosin are formed as the result, probably, of the ensuing decomposition. These, in passing through the liver, are changed into uric acid and urea, and the latter, being highly soluble, is excreted by the kidneys. It occasionally happens, either from inherited inadequacy of the liver, or from functional derangements induced by improper alimentation, that these products are not transformed into urea, and the process being perverted, uric acid is formed in excess. Uric acid, being an exceedingly insoluble substance, is excreted by the kidney with great difficulty. This incomplete metabolism may lead to lithiasis and gout.

The liver being intimately concerned with the formation

and depuration of the blood, all interference with its functions implies derangement of sanguinification, which necessarily affects the digestive processes.

Functional derangements of the liver chiefly arise from the secretion of bile being excessive or deficient in quantity, or abnormal in quality; or they may depend upon the imperfect completion of the metabolic processes, producing lithæmia, a condition invariably attended by sleeplessness. Attention was called to this condition in 1874 by the late Dr. Murchison, to whom we are indebted for a great part of our knowledge of the subject. In discussing the symptoms he dilated at some length upon the sleeplessness that invariably accompanies it, and his words are so full of truth that they are here quoted. "Sleeplessness may, of course, arise from many different causes, but one of its causes is that derangement of the liver which produces lithæmia. When this is the case, the patient is often heavy and drowsy after a full meal, and he may fall asleep at once on retiring to rest; but, after one, two, three, or four hours, he awakes, and then he either lies awake for hours, or he is constantly falling asleep, dreaming or having the nightmare and awaking—four or five times or even oftener in the course of one hour—until the morning comes, when he drops into a quiet sleep of an hour or more, or he is obliged to get up tired and irritable. This sleeplessness, like the vertigo we have already considered, is often induced by particular articles of diet, or by some unwholesome combination of them. What will excite headache, giddiness, or disorders of the circulation in some patients, will in another cause sleeplessness. Sometimes, however, this symptom will occur when the patient is most careful as to diet. What is important also to note is, that in most of these cases there are no obvious symptoms of gastric dyspepsia; the appetite may be good—too good, in fact; the bowels may be regular; and there may be no pain, flatulence, or other discomfort after meals; but there will be found an unusual tendency to the deposit of lithates in the urine, and very often other phenomena of a so-called gouty diathesis. This form of sleeplessness was described a century ago by Cullen, the distinguished nosologist, in these words: 'Persons who labor under a weakness of the stomach, as I have done for a great number of years past, know that certain foods, without their being conscious of it, prevent sleeping.

So I have been awakened a hundred times at two o'clock in the morning when I did not feel any particular impression; but I knew that I had been awaked by an irregular operation in that organ, and I have then recollected what I took at dinner, which was the cause of it. Dr. Haller is liable to the same complaint; and in his larger work especially, he gives the particulars of his own case.'"

The cause of this sleeplessness is irritability in the cerebral cells more or less pronounced, brought about by imperfect depuration of the blood. This excitability initiates sleeplessness in consequence of the perception of stimuli so slight as not to be otherwise apparent. In this respect it resembles that which pertains to intestinal dyspepsia. Sleeplessness is due also to an increased blood-pressure. A minority of the sufferers from lithæmia complain of no other discomfort, but the origin of their insomnia can be recognized by two signs which are invariably present: increased vascular tension, red lithates in the urine. The majority of such patients present many well-marked symptoms. The aspect is dull and jaded; the complexion muddy, sallow, or slightly jaundiced; and the conjunctivæ tinged with bile pigment. The tongue may be clean, but usually it is large, sodden, teeth-indented, and covered with a thick creamy fur; the mouth in the morning has a bitter and disagreeable taste, which may disappear in the course of the day. The breath is often heavy and offensive; the appetite is variable, in some cases it is good, in others it is capricious or bad, the want of appetite being often associated with nausea and even vomiting. The bowels are sluggish and the motions pale; hæmorrhoids are frequent. The urine is scanty, high-colored, acid, of high specific gravity, and deposits urates on cooling. Patients complain of pain in the head, giddiness, and uncertainty in movements; noises in the head; dimness of vision, or of motes floating before the eyes. They suffer from palpitation and intermission of the heart; breathlessness and a sickening sense of oppression which awakes them during the night; pain and weight in the epigastric and right hypochondriac regions, as also about the right, or it may be the left, shoulder. They are often troubled with flatulence and acidity; oppression, discomfort, and drowsiness after meals, followed in an hour or two by feelings of irritability, lassitude, and mental depression. Whether this

depression is due to the absorption of the products of digestion, or to leucomaines which are formed in the processes of digestion, is still a matter of doubt. Dr. Lauder Brunton, who has studied the subject with great care, attributes it to the depressing action of a poison upon the nervous system.

When these marked symptoms exist there is no difficulty in accounting for the sleeplessness.

The subjects of these disorders are peculiarly liable to suffer from acute hepatic dyspepsia or attacks of biliousness from slight indiscretions in eating and drinking. These attacks are usually accompanied by catarrhal conditions of the mucous membrane of the stomach and duodenum, and characterized by headache and vomiting. They resemble in some respects attacks of migraine, for which they are occasionally mistaken.

Treatment.—This obviously entails that the liver must be relieved of work which it cannot overtake, or, in other words, that its work should be proportioned to its strength. The food should be poor in albuminoid elements, that the metabolic processes can be completely effected, and the storage of effete materials in the system prevented. This subject will be considered in detail under the heading of gout, to which disease it is so closely related.

Alcohol must be interdicted to a very large extent, if not altogether, tending as it does to embarrass the liver still further. When it is allowed it should be in the form of brandy or whiskey, well diluted with an alkaline effervescing water; malt liquors and sweet wines being inadmissible. Exercise in the open air is imperative, oxygen being required for the adequate performance of the metabolic changes, and horse exercise is the best of all. Turkish baths are also to be strongly recommended. Sipping hot water night and morning is a powerful stimulant of the hepatic functions.

Mercury in the form of calomel, blue pill, or gray powder must be given until the tongue cleans. Mercury was long ago advised by the late Dr. Graves, and it has gained the approval of many very able physicians in more recent years.

℞ Subchlor. hydrarg., ... gr. ss.
Pulv. ipecac., ... gr. ss.
Ext. taraxac., ... gr. i.

Ft. pil. i. Sig. Take at night, and in the morning, while yet fasting, a dose of one of the natural saline waters.

After the tongue has lost its coating, the activity of the liver should be maintained by a pill containing either leptandrin, iridin, euonymin, or podophyllin combined with aloin.

The increased vascular tension may be treated with the following mixture:

℞	Iodid. potass.,	ʒ i.
	Bicarb. potass.,	ʒ iij.
	Tinct. aconit. (B. P.),	♏ xxiv.
	Tinct. hydrast.,	ʒ vi.
	Aq. chlorof.,	ad ℥ vi.

M. Sig. Take a tablespoonful three times a day, between meals, in water.

Sodium salicylate in 10 to 30 gr. doses, ammonium chloride in 20-grain doses, and sanguinarin in ½-grain doses, are useful remedies.

External applications, as hot poultices at bedtime, or compresses of dilute nitro-muriatic acid, in the proportion of ʒ i. to ℥ ij. of tepid water, over the right hypochondriac region, for eight or ten nights, are usually beneficial.

If sleeplessness is very pronounced an alkaline draught with hops may be given at bedtime. The writer has got excellent results from sulphonal in 20-grain doses two hours before bedtime; and also from methylal in doses ranging from ♏ xv. to ♏ xxx. When the patient awakes and becomes restless and watchful, a teaspoonful of Carlsbad salts, taken with a teaspoonful of syrup of ginger in a good draught of water, has the almost constant effect of inducing the speedy return of quiet sleep. A like draught at bedtime frequently prevents wakefulness.

Hyoscyamus is likewise useful. Equal parts of the tincture, and tincture of hops in teaspoonful doses is a good formula. Opiates, chloral hydrate, etc., invariably do harm, any sleep which they induce being followed by an aggravation of the symptoms by deranging the secretions. Such remedies are to be avoided.

JAUNDICE.

Drowsiness is the usual accompaniment of jaundice, but every now and again the reverse condition is met with. The late Dr. Graves, of Dublin, wrote that "in jaundice every-

thing denoting an unusual state of the nervous system, whether it be too much sleep or too little, demands your attention." He likewise pointed out that the sleeplessness which sometimes occurred, manifested itself at the time that the jaundice was declining and the bile beginning to reappear in the stools.

Sleeplessness in this disease commonly depends upon dyspeptic derangements, some of which we have already considered, and also upon general itching of the skin, caused by the circulation through it of blood laden with bile acids. In regard to the latter, the Dublin physician called attention to the fact, which has since been frequently confirmed by others, that the itching sometimes precedes the appearance of the jaundice.

Treatment.—When the insomnia is due to dyspeptic derangements these must be treated upon the principles indicated elsewhere. When it is due to itching, the free use of alkaline baths and the flesh-brush is useful. The following lotion is serviceable:

℞	Bibor. sodii, ...	℥ i.
	Acid. carbol. pur., ...	ʒ ij.
	Spt. vini rect., ...	℥ ij.
	Aquam, ...	ad ℥ xxiv.

M. Sig. Sponge the body as often as required.

Amylene hydrate is said to be an efficacious remedy. The subcutaneous injection of pilocarpine, as recommended by Dr. Goodhart and others, affords good results.

Where, in spite of these remedies, the sleeplessness persists, the hypodermic injection of morphine combined with atropine must be resorted to.

Sleeplessness occurs in connection with many other diseases of the liver, such as congestion and cirrhosis, affections which are most frequently induced by improper ingesta; the sleep disturbance they inaugurate is therefore considered under other headings. It is also occasioned by neuralgic ailments and gall stones, in which it is obviously due to the pain they cause.

It has long been noted in hepatitis. Dr. Johnston, writing in 1818, remarks that "disturbed sleep and frightful dreams accompany and precede this disease in almost every case."

Ziemssen says that in suppurative hepatitis sleep is disturbed by dreams, and frequently there is more or less insomnia, and that the latter "is considered by medical observers in hot climates to be a characteristic symptom of the disease not to be accounted for by the physical suffering or mental perturbation of the invalid."

It may be that this persistent insomnia is due to the continuously maintained high temperature which characterizes this disease.

The discussion of these diseases is obviously beyond the scope of this work.

CHAPTER XI.

GOUT, ITS SYMPTOMS AND TREATMENT; WITH SPECIAL REFERENCE TO INSOMNIA.

THIS disease is a fruitful, although not generally recognized, source of insomnia. It seems convenient to consider it here.

No disease has been studied with more persistent care, and yet its pathogeny is still *sub judice*.

That it depends upon the presence of uric acid in excess in the blood is definitely known. Sir A. B. Garrod, who demonstrated its presence by means of his widely-known thread experiment, maintains that this excess is a constant accompaniment of acute and chronic gout. There are, however, many contending opinions as to the causes of its retention and defective excretion. It is impossible to attempt any discussion of these moot points in these pages; the remarks concerning them will be limited to those essential to the elucidation of insomnia.

The late Dr. Murchison believed the presence of uric acid to depend upon defective liver function, giving rise to disordered metabolism. He averred that the normal processes by which the nitrogenous elements of the food were converted into urea, a soluble and easily excreted substance, became perverted so that uric acid was formed in excess; and that acid, being highly insoluble and difficult to excrete, was retained in the blood. To this theory it was always objected that gout was not the same disease as lithæmia, and Dr. Bristowe put it tersely when he wrote that Murchison "would naturally consider gout to have some such relationship to the liver as uræmic dropsy has to the kidney."

Garrod ascribes the retention of uric acid in the blood to an inadequacy of the kidney to excrete it. He points out also that in gout the sodium urate is deposited painlessly in the joints. Acute gout follows the deposition, and does not cause

it. On the contrary, he believes an attack of acute gout is an attempt to get rid of the uric acid.

Dr. Ord has given expression to a theory which must always command thoughtful consideration. He considers that the deposition of sodium urate can only take place in joints in which the tissues have previously undergone alteration in structure, and he credits the nervous system with part of the faulty state.

Gout has been attributed to the nervous system by many observers, and among them by Cullen. Sir Dyce Duckworth, Dr. Ralfe, and others, believe that a special centre for gout exists in the nervous system.

The excess of uric acid is therefore attributed to an excessive formation in the liver; to a defective excretion by the kidney, due either to the kidney itself or to a condition of the blood unfavorable for its elimination; and to some abnormal state of the nervous structures.

A great impetus was given to the study of insomnia in gout by the writings of Duckworth and Murchison in 1873 and 1874. The latter stated (p. 687) that the dyspeptic symptoms which disturbed sleep were not associated with any obvious digestive derangements. They both pointed out how prone slight indiscretions in eating and drinking were to interrupt sleep. The question naturally arises, Why should sleep be so easily disturbed in the gouty? The writer believes that it depends primarily upon mal-nutrition of the cerebral cells, which renders them irritable and impressionable. The clinical study of gouty conditions goes far in the direction of substantiating this proposition.

The excess of uric acid in the blood varies from time to time. It is greater, according to Garrod, previous to, and during the early days of, an attack of acute gout, and it is considerably less at its height and during defervescence. It probably varies in like manner in the course of chronic gout. Coincident with these varying quantities of uric acid in the blood, the excretion is decreased and increased in like ratio. It is decreased before the onset, and at the beginning, of the acute seizure, and it is increased toward its termination. The elimination of uric acid varies considerably at different parts of the day. Dr. Haig has shown ("Wood's Med. and Surg. Monographs," Vol. V., No. 2) that it is increased after the in-

gestion of food, and he believes it to accumulate during sleep. The alkalinity of the blood is decreased in gout. Garrod has recorded that it is almost neutral.

The products of cerebral activity or waste are acid. Dr. Lauder Brunton has suggested that alkalinity of the blood is an important factor in the removal of these acid products. It seems to follow that blood, only slightly alkaline, is peculiarly unsuitable for the depurative process. Cells imperfectly deprived of their detritus do not appear to take up oxygen readily, and consequently they cannot be adequately nourished. Hence, they grow excitable and hyper-perceptive, and so responsive to faint impressions. Eventually they assume a state allied to that met with in neurasthenia. It is before the onset, and during the first days of, a paroxysm of acute gout, that the symptoms of mal-nutrition of the nervous system are most marked. They vary from time to time in the course of chronic gout. They correspond to the periods when the blood is known to be most surcharged with uric acid, and to be least alkaline.

The evidence of malnutrition of the nervous system is abundant. During the day it is evinced by the patient in moodiness and depression of spirits, sometimes amounting almost to hypochondriasis. At all times testy, he is apt to lose his temper from trivial causes. He is restless and fidgety. At night his sleep is liable to be disturbed and dream-laden. He often grinds his teeth during his slumbers. When sleep is interrupted his heart is usually palpitating—indicative of perturbed cardiac centres. In the morning he has a headache, indicating an altered cerebral condition. He suffers from fugitive pains in various parts of the body. Sir James Paget pointed out that gout mainly affects the sensory portions of the nervous system. Eventually, it is not uncommon to find the patient presenting all the symptoms described under the head of neurasthenia. If such a patient comes under treatment for the first time the gouty origin is very apt to be overlooked.

It has been suggested that uric acid acts directly upon the cerebral cells, and if this be the case the depuration of the products of waste might be an equally difficult matter. The writer believes the lessened alkalinity of the blood to be the important cause. Some confirmation of this view was lately

gained from the observations of Ehrlich, to which Lauder Brunton called attention. Brunton writes:

"You will remember that the gray substance of the brain is possessed of a great power of reduction, as shown by the readiness with which it reduces aniline colors after death; but during life the necessity for oxygen is so great that it retains within it a sufficient quantity of stored-up oxygen to prevent such reduction taking place under ordinary circumstances. But if its functional activity be augmented by stimulation, its store of oxygen is used up, and thus it becomes ready at once to reduce. Its very activity, however, gives rise to the formation of acid products, which lessen its reducing power, so that the mere supply of fresh oxygen would not be sufficient to restore it to its previous condition unless the acid were neutralized. Arterial blood supplies both these requirements, neutralizing the acid and giving off oxygen to the brain cells."

From these data we may conclude that the presence of acid products in the cerebral cells alters in some respect their constitution. We can also comprehend the explanation of the persistence of gouty insomnia during months or years, in spite of the use of hypnotics; and, on the other hand, why it yields to the use of remedies which augment the excretion of uric acid.

Insomnia may, however, depend to some extent upon an increased arterial tension. In the early stages of the gouty habit this is frequently increased, as it is in most cases of disordered metabolism. At first it is not constant, and it may vary considerably, probably with the quantity of uric acid retained in the system. This would well explain the different qualities of sleep in the same persons at different times. In the later stages arterial tension is dependent upon changes in the blood-vessels of an organic nature, and this is associated with sleeplessness of a more persistent and constant kind.

It seems to the writer that if centres for gout are eventually found to exist in the medulla oblongata, the frequency with which circulatory derangements interfere with sleep will be even more easily explained. In this connection it is worthy of mention that glycosuria—a symptom of gout—can be induced artificially by puncture of the vaso-motor centres. Landois and Stirling write: "When the vaso-motor nerves, which proceed from this centre to the liver, are cut or par-

alyzed in any part of their course, mellituria or glycosuria is produced."

It may be asked why sleeplessness does not uniformly affect all gouty persons, instead of some more than others. Duckworth gives an excellent answer to such a question: "Many sufferers have no troubles connected with the sleeping state, just as many have no urinary difficulties, no hemicrania, and no tophi." A still further answer will probably be found in this, that it is chiefly those possessing cerebral cells congenitally defective in stamina who suffer most severely from sleep disturbance. In gout, as in fevers, those sleep best who have "strong" nervous systems. The rule, to which there are few exceptions, must be remembered, that diseases expend themselves for the most part upon the most vulnerable textures. Irregular gout is usually met with in the lean neurotic, who from his temperament is peculiarly liable to sleeplessness. Moreover, in such cases the true origin of the insomnia may be unrecognized.

Acute Gout.

Paroxysms of sthenic gout are met with most frequently in males of sanguine temperament. Increased restlessness and irritability by day and sleeplessness by night are common premonitory symptoms. When the paroxysm supervenes, sleep is prevented by pain and by febrile symptoms. A quickened pulse and an increased temperature are constantly present. The onset usually takes place during sleep between two and five in the morning; under favorable circumstances the pain yields, and sleep returns toward morning. In the evening the pain and febrile symptoms recur with such severity as to prevent sleep, and these nocturnal exacerbations disturb sleep during several successive nights.

Treatment.—The treatment of this form of insomnia is that of gout itself. Colchicum is the remedy for gouty pain; it should be given with sodium salicylate internally, in doses suited to the individual patient. Opiates are best avoided. Garrod remarks: "Cullen thus answers the question: 'Opiates give the most certain relief from pain, yet when given in the beginning of a gouty paroxysm they cause it to return with greater violence.' . . . My own experience has led me to form a very similar opinion, and in the majority of gouty

cases, unless the pain be very excessive, or there be fear that if not relieved the patient's nervous system will suffer, I always feel disposed to withhold their administration, and trust to other means, as opiates tend so powerfully to diminish the secretions and to augment congestion of the portal system." Chloral and like hypnotics are useless, as they do not influence pain.

Externally, soothing applications afford some relief. Opium, belladonna, and lithium citrate with morphine are all useful. In some cases tincture of iodine alleviates the pain.

Irregular Gout.

It is chiefly to irregular gout that we wish to refer. This is most obscure in its nature. It seems quite certain that uric acid can give rise to disease in almost every texture of the body, without being deposited in them, or without giving rise to any of the ordinary or usual manifestations of gout. Indeed, the most extensive organic changes may supervene, and proceed to a fatal termination, so insidiously and painlessly that they may fail to attract the notice of the victim or his friends.

The symptoms of irregular gout are obscure and ill-defined, and they vary considerably with the textures they implicate. There are two symptoms, however, which are seldom absent, even in the most vague instances; these are, an increased vascular tension and sleep disturbance. When these occur in conjunction one with another they afford a valuable clue to the line of investigation.

We must briefly survey the usual symptoms of chronic or irregular gout as they affect the various systems.

The Nervous System.—This is variously affected. Headache, vertigo, and migraine are by no means uncommon. Noises in the head, often very pronounced and distressing; troublesome throbbing of the arteries of the head, most noticed when the head is placed upon the pillow; irritation of the optic nerve, as evidenced by dimness of vision and scintillations; sleeplessness; restlessness, or fidgets, are generally present. Neuralgia is of frequent occurrence, and usually takes the form of facial or cervico-brachial neuralgia, lumbago or sciatica. Such neuralgias, which often come on during

sleep, are associated with increased blood-pressure, and are only relieved by anti-gouty remedies. Flitting pains, occurring in various fasciæ—pains which are often designated rheumatic—are frequently of gouty origin. They are more likely to be gouty when they follow the ingestion of wine or beer. Cramps in the limbs are common symptoms. They usually obcur during the state of transition from waking to sleeping. If they come on during sleep they interrupt it. They most frequently supervene before the onset of an acute paroxysm—at the time when the blood is surcharged with uric acid; just as they are prone to follow excessive muscular fatigue, when the blood is laden with the acid products of muscle waste. They are not, however, of much diagnostic value, as they occur in many persons suffering from anæmia, cachexia, neurasthenia, and dyspepsia.

All gouty affections have a predisposition to make their appearance during sleep. Apoplexy is sometimes the immediate cause of death. Cerebral mischief always portends evil. The throbbing blood-vessels, tinnitus, and painful affections, are all inimical to sleep.

Alimentary System.—Gout initiates many derangements; amongst others, acidity, flatulence, heartburn, gastralgia, nausea and vomiting, and irregularity and constipation of the bowels, with a tendency to hæmorrhoids. Gastric disorders, so slight as to be characterized by no manifest symptoms, may give rise to sleep disturbance. This is specially true of those arising from trivial indiscretions in eating and drinking, and from the ingestion of food to which some gouty persons are intolerant. The sleeplessness of gout resembles that of hepatic dyspepsia in this respect, but it differs from it in not always arising from such causes. Flatulent distention of the stomach and intestines, by emb rrassing the respiratory and cardiac movements, frequently causes terrifying dreams, nightmare, and disturbed sleep. Tympanites in advanced cases is a distressing and occasionally fatal complication.

Spasmodic dysphagia may occur. In a case under observation for many years it alternated with gouty eczema. Gouty conditions of the mucous membrane of the pharynx are common.

The Liver.—Derangements of the liver are necessarily frequent, and enter into the causation of the affection. The

functional ailments which have already been discussed are apt to cause catarrhal and congestive affections of the liver and its ducts, which eventually lead to indurated and cirrhotic forms of disease.

Circulatory System.—At first there are no organic changes. Palpitation, breathlessness, irregularity of the pulse, increased blood-pressure, and accentuation of the second cardiac sound in the aortic area, alone exist. Changes, commencing in the kidneys, etc., produce thickening of the muscular coats of the arteries, which thickening increases until the vessels become atheromatous and tortuous, when they pulsate visibly, and feel like a cord under the finger. The heart, particularly the left side, hypertrophies, and its impulse becomes forcible and heaving. Eventually failing, hypertrophy interferes with the compensation, and the coronary arteries degenerating, originate retrograde changes in the muscular structures of the heart, the impulse grows feeble, and dyspnœa on exertion becomes very marked. The aorta, becoming atheromatous, may give rise to aneurism. Attacks of angina pectoris are of frequent occurrence. In the early stages, arterial tension prevents the hardened cerebral arteries from contracting their lumen to lessen the blood-supply when the hour for sleeping comes round, and as cerebral activity is maintained, the night is spent in watching.

In the later stages the lumen of the blood-vessels may be so narrowed by degenerative changes that the cerebral substance is even more imperfectly nourished, and sleeplessness in such cases may be due to cerebral anæmia. The nutrition of the brain is still further interfered with by the quality of the blood; the corpuscles, or oxygen-carriers, it contains being greatly diminished. If the patient gets to sleep, the effects of the circulation of deficiently-oxidized and imperfectly-depurated blood through the cardiac, vaso-motor, and respiratory centres in the medulla must not be overlooked. These centres are working at their lowest level, and are liable to be affected by such conditions; hence the nocturnal attacks of palpitation and dyspnœa which so often occur. The late Dr. Milner Fothergill, referring to this point, wrote: "They may be due to spasm of the pulmonary capillaries, or more probably, to the disturbing effect of the waste-laden blood upon the respiratory centres. In sleep the respiratory centre acts less

energetically than in the waking state—is to some extent depressed, in other words; and the waste-laden blood probably further depresses it, till an attack of dyspnœa is the result." The misery endured by a patient suffering from an enlarged heart, atheromatous vessels, and an abnormal blood-current, is occasionally very great. In the evening he nods in his chair, and is quite worn out with sleep; whenever he lies down in bed he becomes wide awake, and lies counting hour after hour; if he dozes, it is to wake up in a start, and toward morning, when quite exhausted, he may get two or three hours' sleep. This morning sleep seems, in most cases, to depend upon the lowering of the circulation which takes place at that hour.

The veins are frequently the seat of inflammatory changes, and the pain these affections cause interferes with sleep.

Respiratory System.—The circulation of blood (possessing qualities just detailed) through the respiratory centres brings in its train asthmatic attacks, and these are more frequent during the night. It initiates catarrhal conditions of the mucous membrane of the nose, throat, and bronchial tubes, and it often gives rise to bronchitis. In the later stages the lesions of the heart may secondarily cause pneumonic consolidation as well as pleurisy and hydrothorax.

Urinary System.—Reference has already been made to the condition of the kidney. The constant circulation through it of blood surcharged with uric acid leads to irritation of its structures, and eventually to cirrhosis. In the early days of the irritative stage the urine may be of high specific gravity, of deep color, laden with pink urates which deposit on cooling, or with crystals of uric acid. As the disease advances, interstitial changes in the kidneys progress, until eventually the cortical substance is practically destroyed, while concurrently the heart and arteries are implicated and the vascular pressure is greatly augmented. The urine, as a consequence, is increased in quantity, and may be quite clear and even pale. The solids may not be diminished, for the urea per ounce, multiplied by the number of ounces passed, shows that an almost normal amount is excreted in twenty-four hours. This is not always the case. The writer, for example, has long had under observation a patient who, during the past two years, has not excreted more than two hundred and fifty grains of urea in

any twenty-four hours, and the amount has occasionally not exceeded one hundred and fifty grains. Yet this patient lives her life fairly well, suffering almost no discomfort, and the most pronounced complaint is of disturbed nights. It seems probable from this and similar cases that many persons, the subjects of gouty kidneys, can, on careful diet and regimen, exist for long periods, excreting urea in much smaller quantities than are supposed to be normal. Albumin in faint traces may appear in the urine from time to time, and tube-casts also, hyaline and granular. They require, however, to be carefully searched for, and their detection is by no means essential to the diagnosis. Dropsy is rare, usually not amounting to more than œdema of the conjunctivæ, of the eyelids, or to a fulness of the ankles toward night. Frequent micturition is usually present throughout the whole course of the disease. Much light is thrown upon such cases by the ophthalmoscope, as albuminuric retinitis is present in many instances. The habitual use of this instrument is not to be omitted in connection with obstinate cases of insomnia.

Gouty glycosuria, depending upon impairment of the liver, and upon an inability to store up glycogen, by setting up vulvar pruritus, interferes with sleep. Pruritus vulvæ and eczema of the prepuce should always suggest sugar in the urine, or, at least, gouty disease.

Integumentary.—Uric acid in the blood appears to give rise to marked irritation in the skin. Sir Charles Scudamore wrote: "And a distressing itching, particularly affecting the back and arms, is very much complained of by those who are liable to gout. It not unusually occurs as one of the premonitory symptoms. An erythematous rash, and urticaria, or nettle-rash, also occur; and in one remarkable instance I saw the latter irritation exist in a violent degree, during two days before the paroxysm; to which, and the treatment adopted, it immediately yielded." Erythema intertrigo under the breasts, in the groins, and round the genitals is, in some cases, most troublesome, as the itching it causes always grows worse at night, and prevents and disturbs sleep. Eczema, too, is a common symptom. It is usually bilateral. The less acute forms are often persistent, and difficult to cure. The active varieties are intractable, and prone to interfere with sleep. The violent paroxysms of itching to which they give

rise not only interrupt sleep, but they prevent its return. The exhaustion which such seizures induce, combined with the loss of sleep, may imperil life. They certainly aggravate the affection. General itching of the skin and pruritus ani are frequently present, and interfere with sleep.

There is a class of gouty patients who, although not suffering from any of these pronounced abnormal cutaneous conditions, have harsh and dry skins—skins that do not easily perspire. These persons are unusually prone to sleep disturbance and asthmatic seizures, and relief from these symptoms is seldom obtained until the skin becomes softer, and assumes healthier functions.

Tophi in the ear are the source of annoyance from the pain they cause when the head is laid on the pillow.

Patients suffering from gout are almost constantly disturbed with burning sensations in the palms of the hands and the soles of the feet; the skin of the former being often very red and tender. A patient observed upon one occasion that he could sleep quite well if he had no hands or feet.

Swelling of the subcutaneous tissue is sometimes the source of discomfort, and is chiefly seen in the back and haunches.

In cases where any or most of the foregoing symptoms are pronounced, no difficulty in the diagnosis presents itself. When, however, sleeplessness is the only symptom, care is required to trace it to its true source. The history of the sleep habit is always helpful. It closely resembles that described by Dr. Murchison, which is quoted under the heading of hepatic dyspepsia (page 687). The patient usually gets to sleep quickly after going to bed, to awake at two or three A.M., and to remain wakeful for hours, usually falling asleep again an hour or two before the time for rising. He gets up worn out and dejected, indeed more tired than when he went to bed. Generally he suffers no discomfort during his wakefulness, but at times he is afflicted with fidgets, and occasionally with restlessness so considerable that he is compelled to rise and wander about. The sleeplessness is increased by all indiscretions in eating and drinking. As a rule, such patients sleep better in summer and in warm climates than in winter and in cold regions, provided always that the heat is not excessive. The warmth appears to promote sleep by relaxing the vascular tension.

The diagnosis rests mainly upon the general symptoms of gout, particularly upon the condition of the vascular tension and of the urine. The teeth sometimes afford a clue, those well-enamelled being frequently seen in the gouty, while in some cases they are worn away by constant friction, from the grinding of the teeth both by day and night that is so characteristic of the disease. The liability to cramps in the limbs and to flushings of the body, and to burnings of the palms of the hands and the soles of the feet, are all indicative of gout. The occurrence of gouty nodes on the fingers, or of nails striated longitudinally, throws much light upon a case. The physiognomy of gouty persons so ably depicted by Laycock is worthy of careful study. The origin of some very obscure cases may be rendered clear if they quickly yield to anti-gouty treatment. This, although an unsatisfactory line of diagnosis, has the sanction of high authority. It is a clumsy method, and one which a physician should avoid, as every surgeon does the use of an exploring needle in the diagnosis of deep-seated suppuration. With care it should be unnecessary.

Causes of Gout.—These are so numerous that we can only refer to a few of them. First must be placed the predisposing cause of heredity. Garrod estimates it in hospital patients at 50 per cent, and in private cases at 75 per cent. Heredity does not throw any light upon the source of gout, as an inadequate liver, inadequate kidneys, a tendency to degeneration in certain structures, leading to the deposition of urate salts, as well as disordered centres for gout, are each and all capable of being transmitted hereditarily. They are likewise capable of being originated anew, and of being transmitted to the offspring. Males, probably on account of their habits and mode of living, are more subject to it than females. In women it seldom shows itself before the menopause, and its development then is the source of much of the insomnia which attends that epoch.

The absence of a distinct history must not be too much relied upon. The symptoms and signs of gout must be interpreted without such a guide. The following will illustrate a not infrequent experience. The writer, early in his career, was consulted by a lady advanced in years, whose life was rendered unbearable by sleeplessness, her only other symptom being an occasional attack of migraine. Examination dis-

closed the fact that she was suffering from high arterial tension, and the opinion given was, that she was the subject of irregular gout. There was not, so far as could be discovered, any history of gout, but that meant only that no ancestor had been pronounced gouty. Abstemious and frugal in her habits to the last degree, and active physically, she had lived a life that was not calculated to have created the disease anew. The diagnosis admitted of no uncertainty, and that the gout was hereditary the writer never doubted. She died eight years afterward of uræmic symptoms from cirrhotic kidneys, and during these years the gradual diminution of urea and uric acid excreted was noted, coincidently with growing changes in the heart and blood-vessels. At the same time the manifestations of irregular gout were observed in her grown-up family. Her eldest child died at the menopause from cirrhotic kidneys with the usual complications; the second is now, and has been for many years, the subject of gouty glycosuria; the third maintains a moderate amount of health by frequently visiting German spas; while the fourth has tophi in his ear, and suffers from gouty irregularity of the heart.

It may be caused *de novo* by the use of foods, in quantity or quality, such as throw an unusual tax upon the liver, or which, by producing congestion in that organ, impair its functional activity. These aliments may be summed up respectively as large quantities of albuminoid, oleaginous, and saccharine substances; and excessive quantities of spirits, wines, and malt liquors. Gout may be developed by a life of luxury and ease, and by the daily neglect of an adequate amount of exercise. It is also caused by deficient supply of oxygen, interfering with the oxidizing processes of the liver. This may be brought about by living and sleeping in badly-ventilated apartments. It may arise from over-fatigue, depressing emotions, great excitement, excesses of all kinds which debilitate the system, as also from the ingestion of lead. It occurs more commonly in damp cold weather.

It is met with in every part of the globe, but, according to Hirsch, it is rare in the tropics. It has been well recognized since the days of Hippocrates, and has always followed in the train of luxury, affluence, and self-indulgence. Hirsch believes it does not now prevail to the same extent that it once did.

It exists in greater proportion in England than in Scotland and Ireland. Sir Charles Scudamore in 1817 wrote: "In Scotland, gout is much more rare than in England. In Edinburgh, where the habits of the people approach the nearest to those of London, it is found most; but it is scarcely ever known among the inferior classes." . . . "In Glasgow, the gout is very rare, even among the higher classes." He attributed this to the people drinking whiskey and living chiefly on farinaceous and other vegetable diet, which he believed initiated diabetes and not gout.

The writer, however, is of opinion that gout is not a rare disease in Scotland, and he believes that it has never been so rare as some writers have supposed. The evidence is certainly conflicting. When Sir Charles Scudamore recorded the rarity of gout in Glasgow, he presented his work on that subject to an eminent physician in that important centre, a work which two years ago (through the kindness of the sole survivor of that gentleman) came into the writer's possession. It is somewhat curious that many of that physician's ancestors had suffered from gout, and that his wife came from an old and honorable family who could number many victims to the same disease, perhaps exceeding in number the total cases which Sir Charles believed to exist in Scotland. Scudamore apparently forgot that Scotland had given London the illustrious Hunters, William and John, both of whom suffered from gout. It is affirmed that they were abstemious men, and therefore were not likely to develop the disease afresh. So far from its occurring from the accident of residence in London, we have the late Professor Laycock's assurance that their father "had at least one of the diseases of the gouty habit, namely, 'gravel.'" No one who has visited their birthplace in the parish of East Kilbride can believe that luxury ever abounded there.

Further, if gout has been such a rare disease in Scotland, it seems inexplicable how Cullen, whose writings on gout are still studied, though a century has elapsed since he penned them, should have found cases for study, as he never practised except in Edinburgh and Glasgow. Notwithstanding his high position and brilliant fame, which must have attracted to him many of the wealthier classes from distant parts, it seems reasonable to suppose, that he must necessarily have studied acute gout in the people among whom he lived.

Again, it is beyond question that Laycock, than whom no man ever left his personality more firmly impressed upon the literature of gouty disease, must necessarily have studied the malady during the last twenty years of his life in Edinburgh.

Garrod, in discussing the influence of alcoholic drinks, states, upon the authority of Dr. (afterward Sir Robert) Christison, that cases of gout are seldom seen in Scotland. Against that must be placed the opinion of Warburton Begbie, who had the most ample opportunities in hospital and private, as well as consulting practice, of accurately estimating its prevalence, and he distinctly expressed his dissent by saying he could not confirm the statement that gout occurred very rarely. Still more recently Fothergill and Duckworth have expressed their opinions that gout is rare north of the Tweed.

Professor Grainger Stewart of Edinburgh, in a letter to the writer, states: "My experience satisfies me that gout and gouty disorders are of very frequent occurrence among the wealthier classes in Scotland, for I see its manifestations constantly in my consulting room, and in cases to which I am called. But it is rare among hospital patients."

The writer, who in Stirlingshire and Ayrshire had ample opportunities of studying disease, is in concord with Stewart; but he would add that gout is prevalent among the middle classes, and that its manifestations are occasionally to be met with among the working population. He is quite unable to agree with the opinion that diabetes is unusually common in Scotland, for he did not meet with that disease frequently; upon the other hand, he had at one time, in his own practice, as many as eight cases of gouty glycosuria under observation. The suspicion, therefore, arises that some at least of the cases referred to by Scudamore may have been glycosuric; hence gouty.

These cases are interesting from a diagnostic point of view, as four of the subjects came seeking advice for sleeplessness, three for pruritus vulvæ, and one for eczema of the prepuce; in each case the glycosuria was discovered in investigating the cause of the symptom.

This question of gout in Scotland has been raised for the purpose, mainly, of expressing the opinion that the use of whiskey is not so free from the risk of engendering gout as some suppose.

Treatment.—It goes without saying that the treatment of gouty insomnia is practically that of the disease itself. We shall, therefore, briefly indicate it.

The first aim must be to remove from the blood the excess of the uric acid which contaminates it; and second, to arrange the patient's life and regimen so as to prevent its further excessive formation and reaccumulation.

One of the conditions responsible for the excess of uric acid must be held clearly in view—an impaired liver; for it is only by regulating the work imposed upon that organ, in accordance with its functional activity, that the abnormal formation can be obviated.

There is an overwhelming accumulation of evidence to show that in no disease is the life and health of an individual so entirely in his own hands as in gout. He can, if he will, do much to procure immunity from his enemy, and to enjoy a healthy and active life. The supplies must be cut down to the actual requirements of the body, so that waste-products may not be allowed to accumulate. It is specially necessary that nitrogenous substances should not be taken in larger quantity than is needed for tissue formation; while the amount of starches, sugars, and fats consumed should be such as can be quickly and easily digested and assimilated.

The meals should be fixed at regular hours, and mastication slowly and thoroughly performed. Late meals are undesirable, the best hour for dinner (which ought to be a light repast) being 7 o'clock, and luncheon should constitute the most substantial meal of the day. A few general indications may be added as regards diet.

All meat should be well kept and plainly cooked, white meat being preferred to brown. The best forms are, mutton and lamb, lamb's head or calf's head, sweetbread (the throat is the best), tripe, game, and poultry. Fat bacon is admissible at breakfast. Beef, pork, and veal are best avoided.

Soups (not too strong), such as clear, white, oyster, or made with white fish, are all good.

Fish, as sole, turbot, brill, halibut, plaice, whiting, or raw oysters, is very suitable.

Eggs must be eaten sparingly.

Milk and milky puddings (without eggs) and farinaceous foods of all kinds.

All vegetables (excepting rhubarb, tomatoes, sorrel, asparagus, broad-beans, and peas), provided they do not cause flatulence.

Ripe fruits, either cooked or uncooked, when they agree, are excellent.

Saccharine and oleaginous matters are to be eaten sparingly, tending as they do to produce dyspeptic disturbance.

It is absolutely necessary that a quantity of fluid be taken daily, as diluents promote the excretion of the solids. The best of all is pure water, and a tumblerful (warm or cold) should be sipped every morning during dressing, and another of Apollinaris or seltzer-water before bedtime. Skim milk and whey are good diluents. Tea and coffee are to be taken sparingly, as they retard digestion and, like alcohol, hinder tissue-metamorphosis.

If the patient is strong he should eschew alcohol in every form, but when some stimulant is deemed advisable, the quantity should be limited and taken with meals only. Malt liquors and heavy wines, as burgundy, port, or sherry, must be forbidden. The best forms are light claret, hock, sauterne, and well-matured dry champagne. Champagne disagrees with many gouty persons, but it suits an equal number better than any other wine, just as Amontillado agrees with a small minority; and when experience dictates such a fact it is not to be ignored. Sparkling hock is a light and agreeable stimulant, which suits many patients well. Whiskey and unsweetened gin freely diluted with an alkaline water are admissible. Upon the ground that gout was unknown (?) in Scotland, a country famous for the consumption of whiskey, that stimulant has been largely prescribed in gouty cases. Time will probably show that it is not so free from objection as is supposed.

It remains to be added that though the great proportion of gouty persons are best treated upon the lines just indicated, there are some who do not get on well upon such a regimen. Their idiosyncrasies rebel, and they are better in every way upon food and stimulant restricted in quantity only. Some of the most troublesome cases of irregular gout are met with in the most abstemious and in tea drinkers. Many who look strong and plethoric bear lowering treatment very badly.

The late Dr. Parkes, in his work on Practical Hygiene,

states that the standard daily diet for an adult man should consist of—

Nitrogen, ...	316.5	grains.
Carbon, ...	4862.	"
Salts, ...	461.	"

and he gives the following table, which indicates the constituents of ordinary food:

Substance.	One ounce (=437.5 grs.) contains in its natural state in grains:			
	Water.	Nitrogen.	Carbon.	Salts.
Uncooked meat (beef)	328	10.35	64	7
Uncooked fat meat (beef)	275.6	9.6	98.3	16
Cooked meat	236	19	117.7	13
Bread	175	5.5	119	5.6
Wheat flour	65.6	7.6	169	7.4
Biscuit	35	22.7	183	7.4
Rice	43.7	8.5	176	2.2
Oatmeal (Letheby's numbers)	65.6	8.7	172	13
Maize	59	7	176	6
Peas	65.6	15	161	10
Potatoes	324	1	49	4.4
Carrots	398	1.4	18	3
Butter	26	.2	315	11.8
Egg	321	9.3	71.5	4.4
Cheese	161	23	162	23.6
Milk	380	2.75	30.8	2.6
Sugar	13	....	187	2

The clothing should be light and warm to promote the free action of the skin, and to prevent the occurrence of chills. Exercise is probably *par excellence* the best of all the means of treatment. Bodily activity must therefore be enjoined. It is essential that it be taken in the open air, as a plentiful supply of oxygen is needed. Horse exercise is the best of all, as it increases the functional activity of the liver, and relieves plethora of the abdominal viscera. Fatigue and all depressing influences must be avoided.

A fair amount of mental work is beneficial to health, and promotes sleep. Overwork, on the contrary, is detrimental.

The morning bath is best tepid, and soap should be freely used, the soap being of suitable quality. The Turkish bath, taken under medical advice, is of great service. The shampooing is of special service.

A mild and dry climate suits the gouty best, and it conduces to improved sleep.

Mineral waters have long been sought after by the gouty,

and, conjoined with altered methods of living, such as early hours, plain and simple feeding, with change of air and scene, they are frequently highly beneficial. In this country the waters of Bath, Cheltenham, Harrogate, Buxton, Droitwich, Leamington, Woodhall, Moffat and Strathpeffer are chiefly in request. Abroad, the spas are without number, each possessing certain climatic advantages, and the waters differing in constituents and temperature. The resort in each case must be selected with special reference to these factors. Among them may be named Vichy, Homburg, Carlsbad, Marienbad, Contrexéville, Kissingen, Wiesbaden, and, when arthritic troubles are present, Aix-les-Bains and Luchon.

General Medication.—The emunctories must be kept in an active state. The skin has been alluded to, and also the kidneys in connection with the use of diluents. The bowels should be moved daily.

To reduce arterial tension in the earlier stages of the affection, and to promote the excretion of uric acid, certain medicines which act upon the liver and kidneys are useful. Dr. Noël Paton recently ascertained from his experiments upon dogs that "the formation of urea in the liver bears a very direct relationship to the secretion of bile by that organ," and also "that drugs which increase the quantity of bile in dogs . . . also increase the urea in the urine" (Landois and Stirling). This is exactly in accordance with clinical experience. An occasional dose of calomel or blue pill at night, followed in the morning by a dose of Friedrichshall, Püllna, or Hunyadi-Janos water, or of sodium sulphate, is always beneficial. If, for any reason, it is desired to avoid mercury, then podophyllin, euonymin, leptandrin, and iridin with colocynth or colchicum may be employed separately or in combination. Colchicum has a very decided influence on the excretion of urea and uric acid, and no reliable evidence has yet been forthcoming that its use is attended by any bad effects, as has been so frequently and popularly alleged; on the other hand, there is a large consensus of opinion as to its utility. The following is a useful pill in persons who are robust:

℞ Pil. hydrarg., ... gr. i.
Pil. coloc. co., ... gr. iij.
Ext. colchic. acet., ... gr. i.
Ft. pil. i. Sig. Take at bedtime.

Sulphur is in many cases a valuable remedy:

℞ Pulv. guaiac., ... ʒ v.
Sulphur. lact., ... ʒ iij.
Mel. dep., ... ʒ vi.
Pulv. glycyrr., ... gr. xx.
Ft. elect. Take a piece the size of a hazelnut at bedtime.

The alkalies, such as the salts of potassium and lithium, by entering into combination with the uric acid, and forming soluble salts, promote the excretion of the acid The sodium salts forming urate of soda, which is highly insoluble, are to be avoided. Potassium iodide, and bicarbonate, and sodium salicylate are useful remedies, their action being promoted by free dilution. Sal ammoniac is likewise a reliable drug, promoting the excretion of solids. In dyspeptic conditions, alkalies should be given after meals, and the use of alkaline waters during meals avoided, as likely to increase the acidity. The following powder is serviceable:

℞ Bicarb. potass.,
Carb. magnes. pond.,
Carb. bismuth., ... āā ʒ iij.
Pulv. aromat. co., ... ʒ i.
M. Sig. Take a teaspoonful in water after meals when required.

When flatulence is troublesome some charcoal or sulphocarbolate of sodium may be added to it. The following pill is useful:

℞ Terebinth. Chiæ, ... gr. iiss.
Gum. galban., ... gr. iss.
Pulv. ipecac., ... gr. ⅔.
Ft. pil. i. Sig. Take one night and morning.

Should tympanites be pronounced, electricity (the continuous current) will often enable the bowel to pass the flatus onward. Quinine or Warburg's tincture, injected into the bowel, are also reliable agents. An enema of the infusion of rue is an efficacious remedy.

The cardiac symptoms require attention. In the early stages of the disease tincture of aconite controls excitement and palpitation, and relaxes vascular tension. In angina pectoris the nitrites are called for; they also relieve the mi-

graine and headache which occasionally prove troublesome. In the stage of failing compensation of the heart digitalis and ferruginous tonics may be required, and it is advantageous to mix them with sal ammoniac.

℞	Hydrochlor. ammon.,	ʒ iv.
	Tinct. ferri. mur. (Ed. Ph.),	ʒ iv.
	Tinct. digital.,	ʒ i.
	Glycerin.,	℥ i.
	Aq. chlorof.,	ad ℥ vi.

M. Sig. Take a tablespoonful in water thrice daily after meals.

Digitalis must be given cautiously, as it may precipitate an apoplectic seizure by raising still further the blood-pressure. Asthmatic and bronchitic attacks yield to ordinary treatment for gout. Nocturnal dyspnœa, depending upon undue irritability or impressionability of the respiratory centres, is at times relieved by the following:

℞	Tinct. belladon.,	ʒ ij.
	Liq. strychn.,	ʒ i.
	Spt. ammon. arom.,	ʒ vi.
	Spt. chlorof.,	ʒ vi.
	Aquam,	ad ℥ vi.

M. Sig. Take a tablespoonful in water at five P.M., at bedtime, and during the night if required.

Irritability of the bladder is alleviated by potassium bromide and henbane.

Neuralgia needs special as well as general treatment; local applications of camphor-chloral or menthol, with the internal administration of sal ammoniac, afford good results (p. 637). Antipyrine likewise acts well, but it has the objection of raising the blood-pressure. Many cases of gouty lumbago yield to acupuncture, and also to dry cupping, as sciatica does to blistering, and muscular pains to deep massage. Morphine, however, has to be resorted to when the pain is urgent and severe.

When cramps in the limbs tend to recur at night, the avoidance of excessive muscular fatigue must be enjoined. If that cannot be dispensed with, a warm bath at bedtime and a draught of lithium citrate, or potassium bicarbonate, with a

full dose of sumbul or camphor, will probably avert the seizure. Amylene hydrate has been greatly lauded in this troublesome ailment. It is averred that cramps do not occur so frequently in persons who sleep with the head of the bed well raised. A high pillow is not sufficient. For immediate relief when the cramps come on, nothing answers so well and quickly as turning out to stand upon a piece of cold wax-cloth at the side of the bed.

Affections of the skin must be sedulously attended to, as they always disturb sleep. General pruritus may be relieved by warm alkaline baths, or by lotions, as boracic acid, potassium bromide, or carbolic acid. A solution of menthol has been recommended, but it not rarely hinders sleep by the cold sensation it produces, as well as by its smell (p. 633).

In acute eczema every effort must be made to allay the paroxysmal itching, and to promote sleep. The nightly administration of cannabis indica, hyoscyamus, camphor monobromide, or belladonna, either given alone or in combination, will insure this. In urgent cases morphine may be required. Diuretics and mild mercurials must be given, and if arsenic be prescribed, its effects should be carefully observed, as it occasionally increases the distress. Locally, the exposure of the surfaces to the air and frequent washings must be avoided. Dusting the parts with boracic acid, lycopodium, or oxide of zinc, and protecting them with starch poultices, are suitable remedies. In the subacute cases, ointments spread on linen should be carefully laid over the parts to exclude the air. The following have been found useful: Bismuth subnitrate, 6 parts; zinc oxide, 1 part; cerat. Galeni, *q.s.* to make a soft ointment; zinc carbonate, 6 parts; salicylic acid, 1 part; cerat. Galeni, a sufficiency to make an ointment; or boracic acid ointment. In chronic cases zinc ointment, containing either carbolic acid, tar or ichthyol, are suitable. In dry and chronic cases the itching is quickly relieved by sulphurous acid.

Pruritus ani must be treated locally as well as generally; sponging the parts with hot water at bedtime and then applying one or other of the following remedies usually affords relief. Dusting with equal parts of powdered sulphur and oxide of zinc, or applying calomel ointment (ʒ i. to ℥ i.), cocaine ointment (10 to 20 per cent), black wash, carbolic acid lotion (1 to 100).

℞ Acid. hydrocy. (Scheele's), ... ℈ij.
Sulph. zinc., ... ʒ ss.
Oxid. zinc., ... ʒ ij.
Glycerin., ... ℥ i.
Aq., ... ad ℥ vi.
M. Sig. Apply at bedtime.

When there are small cracks or fissures in the skin round the anus, verdigris ointment often answers admirably. Mild mercurials with small doses of sulphur, as in the above formulæ, are useful remedies.

If the sensation of burning in the soles of the feet hinder sleep, it may, in some instances, be relieved by an india-rubber bag filled with cool or cold water, which can be used or discarded at pleasure.

Sleeplessness will frequently yield to the foregoing regimen, and require no special treatment. If it does not, attention must be paid to the temperature of the sleeping apartment, for if it is a few degrees higher or lower than the sitting-room it may cause wakefulness.

Douching the head with luke-warm water, a hot foot-bath, a wet pack, or friction of the body at bedtime, are all useful aids to sleep. Dr. Broadbent has suggested lying with the back of the neck on a hot bottle. It has, however, always seemed doubtful to the writer whether such an aid as this did not frequently act as a disturbant. The following has been found a useful remedy in the early stages.

℞ Tinct. aconit. (B. P.), ... ♏ iij.
Tinct. belladon., ... ♏ x.
Bicarb. potass., ... gr. xx.
Aquæ menth. pip., ... ℥ ij.
M. Sig. Take at bedtime.

It is also efficacious taken a few minutes after awaking. A whiff of nitrite of amyl, or a dose of Carlsbad salts, are both useful on awaking.

In severe cases it is well to apply leeches to the temples, and repeat them as often as it is necessary. Chloral hydrate and paraldehyde are the best hypnotics. Opiates and morphine are always hurtful.

In the later stages the nitrites are the best hypnotics: two

grains of sodium nitrite thrice daily, with an occasional sniff of amyl nitrite during the night, seldom fails to do good. The writer has seen two minims of a one-per-cent solution of nitroglycerin given at bedtime induce sleep which lasted nine hours.

CHAPTER XII.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE CIRCULATORY SYSTEM.

In every case of insomnia, the causation of which cannot be traced to some disorder of the nervous or digestive systems, or to derangement of the metabolic processes, it is necessary to inquire most narrowly into the state of the heart and blood-vessels; for participating, as they do, with the nervous system in the daily-increasing wear and tear of life, they not infrequently become impaired by the strain they are called upon to bear. Many of the diseases that so arise become the sources of insomnia.

Organic changes in the heart and blood-vessels may originate, and insidiously increase, until they develop into positive and alarming lesions, without exciting the attention of the victim; and it is not until some secondary affection, such as dyspepsia or insomnia, attracts his notice, that he seeks advice. Indeed, he comes on account of symptoms which he does not attribute to his heart, and among which perturbation of sleep is one of the most common and significant.

It has been often and truly said, that a patient suffering from heart disease seldom seeks aid for it. On the other hand, those who ask counsel for symptoms which they deem due to cardiac disease, are either the subjects of neurosal affections or do not suffer from any disease of the heart at all. It is indeed rare that a patient connects his want of sleep with his heart, unless he is suffering from that very apparent and distressing symptom, palpitation. Yet, there is scarcely a derangement of the heart, either functional or organic, which does not modify the distribution of blood in the brain and nervous system to some extent. This altered blood-supply is almost invariably attended by disturbed sleep, nightmare, or dreaming, and, in some instances, by persistent insomnia.

Alterations in the cerebral circulation arise from causes interfering with the normal rhythmic action of the heart, such as occurs in cardiac excitement; from alterations in the tone and lumen of the arteries, capillaries, and veins, leading to modifications of blood-pressure and to venous stasis; and from variation in the quantity or quality of the blood transmitted. Such vascularization is inimical to sleep, for among the conditions essential for good sleep are, a heart beating quietly and slowly, and a lowered arterial tension. It is only by scrutinizing all these points closely, and searching for signs of heart disease, that this source of sleeplessness can be disclosed, and its relief effected.

It is proposed, first, to briefly allude to the most usual symptoms of heart disease which prevent sleep, namely, palpitation, dyspnœa, Cheyne-Stokes' respiration, cardialgia, and angina pectoris; and then, in a few words, to refer to sleeplessness as it occurs in some valvular diseases, in fatty degeneration of the heart, and in aneurism.

Palpitation.—Among the numerous symptoms of functional and organic affections of the heart, which interfere with sleep, palpitation holds the first place. It may present itself at any hour during the day or night, either in trivial degree or in the most urgent form; in the latter, the heart beats vigorously and tumultuously, causing the walls of the chest to heave and the larger blood-vessels of the body to throb and pulsate visibly.

Palpitation may be a symptom of organic disease of the heart, the structural changes being commonly those of degeneration, or hypertrophy of the muscular walls, or dilatation of the cavities; or it may be caused by aneurism. It appears chiefly after exertion when the heart is coping with defective conditions and quickened movements, struggling, in short, in its weakened state, to discharge, temporarily, work more laborious than usual.

Functional palpitation is met with usually in younger persons, and is either associated with hæmic changes, neurosal derangements, or toxic causes. Frequently it is more severe in character than the organic.

Palpitation from hæmic disorder depends upon two causes, blood faultily formed and imperfectly depurated.

Examples of the former are to be found in those suffering

from anæmia, chlorosis, and from debility, however brought about; in which states the quality of the blood is impaired, and the blood pressure modified, the cardiac centres perceiving and resenting quickly an imperfectly oxygenated blood circulating through them. Examples of the latter are to be found in those suffering from defective metabolism, as in gout, etc.

The neurosal cases can usually be traced to overwork, worry, excesses, over-excitement of the passions or affections, hysteria, or to sources of reflex irritation, *e.g.*, dyspepsia and other derangements of the gastro-intestinal canal, worms, ovarian or uterine disorder, and spinal irritation.

The toxic causes embrace the indiscreet use of tobacco, tea, and alcohol.

It occurs invariably in exophthalmic goitre. That which supervenes in hysterical patients (male or female) is associated with heightened blood tension—constriction of the arterioles—as evidenced by the copious secretion of colorless urine.

The diagnosis between palpitation depending upon organic disease, and functional disorder, must rest largely upon the presence or absence of physical signs of organic heart disease. It is more probably organic when the pulse is irregular; when murmurs indicative of valvular lesions are heard; or when the heart is enlarged. We may conclude it is organic if we find any of the common secondary effects of heart disease, such as dropsy, are present; or that the palpitation and the accompanying dyspnœa are set up and further aggravated by exertion; or when we find the attack is not severe, and occurs only as an exacerbation of a more permanent disorder.

On the other hand, it is more likely to be functional when the pulse is intermittent; when murmurs are absent, or if present, most distinctly heard at the base and in the large vessels of the neck, their intensity being increased by the erect posture; when the heart is of small size; when the attacks are severe and paroxysmal in character, and when they come on during rest, and are benefited by exercise.

Palpitation, whether of organic or functional origin, is liable to prevent the onset of sleep, and to interrupt it when it has ensued. In the latter case severe attacks, occurring at distant intervals and traceable to some exciting cause, are invariably functional; while attacks less severe, recurring fre-

quently without apparent reason, are generally organic in their genesis.

The late Sir Thomas Watson wrote: "I must caution you, however, against the mistake which is often made, of inferring that the heart is free from organic change because its irregular movements are accompanied by dyspeptic symptoms. Structural disease of that organ is very apt to derange the digestive functions. You will commonly find that patients who labor under such disease are exceedingly liable to flatulence of the stomach, and free eructation of the gas which plagued them mitigates wonderfully the cardiac distress. It does so, no doubt, by relieving the diaphragm from that upward pressure which embarrassed the motions of the heart." . . . "The age, and frequently the sex, of the patient form leading points in the diagnosis. Nervous palpitations are apt to come on when the patient is quite at rest: palpitations that result from organic disease are, on the contrary, mitigated, usually, by repose. The occurrence of palpitations in the night, however, is but an equivocal circumstance, for nervous persons who dream, awake often with palpitation; and the recumbent posture is apt to excite or to aggravate the palpitations that are organic."

Palpitation may be excited during sleep by lying on the left side, by large accumulations of flatus in the stomach, and by all perturbing impressions arising in the economy. These impressions being transmitted to the cardiac centres in the medulla, and then reflected through the sympathetic to the heart, instigate disorderly and excited movements, which arouse the sleeper; and the throbbing of the heart, and pulsations of the vessels, dyspnœa, and feelings of oppression, combined with mental agitation, prevent the recurrence of sleep for some hours.

The distress which palpitation causes is occasionally so great as to make the patient afraid to fall asleep again, lest it should return. In the majority of cases, it is the hyperæmia of the brain that interferes with sleep, hyperæmia being inseparable from an accelerated action of the heart, and an increased blood-pressure.

Treatment.—In each and every case the exciting cause must be obviated. When it depends upon weakness of the muscular walls, or upon dilatation of the cavities of the heart,

patients should be counselled to avoid exertion or strain, and not to lie on the left side. The food should be highly nutritious, and as concentrated as possible; stimulant being allowed up to the limit of promoting the digestive processes.

Digitalis and convallaria majalis are the remedies most called for.

℞	Tinct. digital.,	ʒ ij.
	Tinct. nucis vom.,	ʒ iss.
	Spt. ammon. arom.,	ʒ vi.
	Aq. chlorof.,	ad ℥ vi.

M. Sig. Take a tablespoonful every three or four hours in water.

Or,

℞	Ext. convall. maj.,	ʒ i.
	Tinct. scill.,	ʒ ij.
	Syr. prun. virg.,	℥ iss.
	Aquam,	ad ℥ vi.

M. Sig. Take a tablespoonful very three or four hours in water.

The digitalis must not be pushed to the point of nauseating, nor the convallaria to that of relaxing the bowels. In some very pronounced cases where these measures failed, the writer has got excellent results from 2-grain doses of citrate of caffeine thrice daily, with cold-water compresses applied over the cardiac region, as recommended by Schrötter. Some able physicians caution against the use of these cold applications, but the writer, who has employed them in a large number of selected cases of palpitation, arising both from organic and functional diseases of the heart, has never met with any untoward result from their judicious employment.

During the attack the patient should be propped up in bed; and bromide of potassium may be cautiously given, along with a stimulant, such as brandy and water. Morphine in small stimulating doses of gr. $\frac{1}{12}$ to gr. $\frac{1}{10}$ administered hypodermically, is of great service, often giving instantaneous relief. In palpitation, occurring at the close of a long and exhausting illness and causing much distress and sleeplessness, morphine, even in minute doses, is not free from risk, as it occasionally induces the sleep that knows no waking, and that

without producing any of the symptoms of morphine poisoning. In such cases the induction of perspiration is the most suitable remedy, for in them, as in almost all forms of palpitation, sweating seldom fails to give more speedy relief than any sedative medicine.

In the aged, no remedy seems to relieve palpitation and promote sleep so well as a teaspoonful of sal volatile and chloric ether, in equal parts, in water, frequently repeated.

In palpitation in connection with hypertrophy of the heart, as in the gouty, the diet must be attended to, nitrogenous food being limited, and stimulants forbidden.

℞	Iod. potass.,	ʒ ij.
	Bicarb. potass.,	ʒ iij.
	Tinct. cimicifug.,	ʒ vi.
	Infus. serpent.	ad ℥ vi.

M. Sig. Take a tablespoonful thrice daily in water.

If the arterial tension be pronounced, ♏ ij. of tincture of aconite (B. P.) may be added to each dose. During the attack, 20 grains of chloral hydrate, or from 2 to 8 grains of the tannate of cannabin, or 45 minims of paraldehyde, may be given.

The treatment of palpitation due to functional causes may be considered under the following heads:

Hœmic.—The diet and regimen must be regulated in accordance with the suggestions already given under the head of cerebral anæmia. Cardiac tonics are required, while the manufacture of blood-corpuscles is encouraged.

℞	Pulv. digital.,	gr. ss.
	Arsen. sodii,	gr. $\frac{1}{40}$.
	Ferri redact.,	gr. iv.
	Ext. calumb.,	q. s.

Ft. pil. i. Sig. Take one pill after meals thrice daily.

For immediate relief the following is useful:

℞	Brom. potass.,	ʒ iij.
	Spt. chlorof.,	ʒ vi.
	Mist. camph.,	ad ℥ vi.

M. Sig. Take a tablespoonful every hour or two.

When it is due to the effects of disordered metabolism, without any hypertrophy of the heart, the diet and regimen must be arranged suitably; while mercurial purgatives and

aconite with alkalies are indicated. For immediate relief the following will be found useful:

℞	Tinct. hyoscy.,	ʒ ss.
	Tinct. cannab. ind.,	♏ x.
	Mucil. acac.,	ʒ ij.
	Aq. camph.,	ad ℥ ij.

M. f. h. Sig. Take at once.

The skin in such cases demands unusual attention, an occasional perspiration being invaluable. Soap should be freely used.

Neurosal palpitation, such as arises from conditions which induce neurasthenia, requires the diet and regimen to be adjusted on the lines laid down when writing on the latter subject. Exercise is important, and gymnastics are to be preferred to walking. In those in whom it depends primarily upon ungratified desires, nymphomania, etc., the mental energies must be directed into new and healthy channels, and all exciting literature and day-dreaming avoided. Cold or tepid baths are daily required. Turkish baths are also beneficial. Tonics, as quinine, phosphorus, and strychnine, are useful. For the attack, the patient should have cold applications over the heart, and if it has disturbed sleep, he may wander about the bedroom taking an air bath, and sipping occasionally some cold water. The valerianates, with ammonia, camphor, and chloric ether, may be given freely. Monobromide of camphor is also a reliable remedy. When palpitation is due to reflex irritation, as disorders of the gastro-intestinal canal, or of the uterus, ovaries, etc., these causes must be remedied, ere improvement can be obtained.

Toxic palpitation requires the abandonment of the poisoning agent, *e.g.*, tea or tobacco.

Dyspnœa.—This is a symptom of almost every form of heart disease and aneurism. It is distinct from the breathlessness which characterizes pulmonary and other complaints, and which will not be discussed here. In the graver cardiac lesions it is often associated with palpitation, Cheyne-Stokes' respiration, cardiac pain, and angina pectoris, although it may alone be present. It may exist in very varying degrees, in some instances being so slight as to be perceived only after exertion, or when breathing a close atmosphere. Some pa-

tients experience it only when sleeping in a badly-ventilated bedroom, and obtain relief simply by opening the door or window. In other cases it comes on paroxysmally, usually during sleep, and when that is deepest, at a time when the respiratory centres are working at their lowest possible level, and consequently more liable to be affected by an altered vascular supply. The implication of the medullary centres is further evidenced by the sickness and vomiting, which occasionally terminate these nocturnal attacks. Irritability of these centres once initiated may cause breathlessness from the most trifling excitations, or perpetuate it for a time after they are removed. Lastly, dyspnœa may be constant and distressing, amounting to orthopnœa, and in such cases the symptom is greatly aggravated if any attempt be made to resume the recumbent posture. This severe breathlessness is usually associated with mitral or other organic disease in an advanced stage, in which dropsy is general, and has supervened in the larger cavities of the body, as also in aortic aneurism.

Dyspnœa depends chiefly upon poisoning of the respiratory centres with inadequately oxygenated blood, and this may arise from an excess of carbonic acid in the blood, the result of impeded circulation in the lungs; or it may be due to a want of oxygen, as in anæmia, in which there is a scarcity of oxygen-carrying corpuscles. It is excited by blood imperfectly depurated, as in lithiasis, and especially is this the case, when the arterial tension is increased.

In patients predisposed to its invasion, it may be inaugurated in several ways, *e.g.*, by sleeping in an atmosphere deficient in oxygen. The respirations during sleep, being fewer and shallower, the want of oxygen is more quickly felt than when the respirations are more frequent and deeper. By impressions transmitted to the respiratory centres. In health, such sensations modify the character of the breathing during sleep; it is not, therefore, surprising that in diseased conditions they should initiate dyspnœa. They may arise in any part of the economy, and they frequently do so in the gastro-intestinal canal. By causes which embarrass the free movements of the heart and lungs, as occurs when the diaphragm is pushed up by a distended stomach, an incident most likely to happen in the recumbent posture during sleep.

Treatment.—It is impossible to discuss the treatment of

dyspnœa satisfactorily, apart from the conditions upon which it depends. We may, however, indicate generally its main lines.

Posture is of the first importance. The patient should either be well propped up in bed, or sit in a chair, so that the capacity of the chest may be increased as much as possible.

The air of the room should be pure, while an equable temperature is maintained, and draughts avoided.

The digestive processes must be attended to, and all derangements rectified.

In those grave cases of advanced disease, associated with relaxed vascular tension, digitalis, convallaria majalis, or strophanthus, with stimulants, such as ammonia, chloric ether, etc., must be pushed freely. If the attack terminates sleep, a minute dose of morphine (gr. $\frac{1}{12}$) should be injected hypodermically.

When the tension is increased, as in lithiasis, nitrite of sodium, nitrite of amyl, or nitro-glycerin, must be resorted to. Anæmia must be treated in the usual way, arsenic being preferred to iron. A dose of chloral hydrate, with potassium bromide, is suitable for combating the seizure. Belladonna, given every two, three, or four hours, will be found very efficacious. It is alleged that its alkaloid, atropine, acts upon the constrictor fibres of the vagus, paralyzing them.

Cheyne-Stokes' Respiration.—This peculiar form of respiration, first recognized by Hippocrates, has been variously designated rhythmical dyspnœa, ascending and descending respiration, etc. It was so carefully studied by Dr. Cheyne and Dr. Stokes that their names are now commonly associated with it.

It is met with chiefly in diseases of the heart and head; but it has also been observed in febrile affections, as typhoid fever, diphtheria, and erysipelas; and in morphine and chloral poisoning.

It is usually a symptom of the graver forms of heart disease, such as fatty degeneration, dilatations of the cavities and aortic lesions, and sometimes occurs in the process of dying. The causation of this symptom is obscure; certainly it is not definitely known. Tizzoni discovered "histological alterations in the bulb and pneumogastric nerves." The late Dr. Warburton Begbie, in discussing the historical case of Philiscus,

detailed by Hippocrates, said: "Sleeplessness was a notable feature; and although the febrile condition under which the patient labored may be the explanation of this symptom, it is at least as reasonable to suppose that the neurosis of the vagus on which the peculiarity of his breathing depended was its cause."

Such respiration prevents the onset of sleep. The abject misery which a patient, thoroughly worn out, suffers in struggling to get to sleep is very great indeed, and can only be realized by those who have experienced its terrors. If sleep be not obtained, the downward progress is greatly accelerated.

Treatment.—Besides the treatment of the disease upon which it depends, morphine and atrophine, hypodermically injected, are the two remedies worthy of confidence. The doses should be as small as is consistent with the production of sleep.

Pain and Angina Pectoris.—These are by no means rare concomitants of heart disease, indeed pain, more or less intense, is a frequent symptom of cardiac and aneurismal affections. Cardialgia, or what may be designated pseudo-angina, varies in its severity and duration; it may be slight and fleeting, or severe and lasting. It usually radiates through the chest and back, but it may affect the neck and jaws; it is neuralgic in character, and is apt to be mistaken for that ailment, especially when it occurs in those whose nutrition is defective. It may awaken a patient from his sleep, and sometimes in a terrifying dream, which causes him great distress. A patient lately told the writer that she was only conscious of dreaming thrice in her life, and upon each occasion (at intervals of several years) she was the subject of cardiac pain. Occasionally it seems to be excited by indigestion and by indiscretions in eating and drinking, as well as by over-fatigue; also by anæmic conditions.

Closely allied to this, but of far more grave and terrible import, is angina pectoris, or breast-pang. It is characterized by paroxysmal, agonizing pain, radiating through the chest, back, and arms, and accompanied by an overwhelming sensation of suffocation and impending death; this combination of symptoms never failing to appall the sufferer.

Its pathogeny is by no means definitely ascertained. Whether it affects primarily the cardiac muscle (spasm), or the cardiac plexus (neurosis), is unknown. The diseases with

which it is most commonly associated are well recognized. It occurs most frequently as a symptom of fatty degeneration of the heart; and in diseases occasioning a sudden constriction in the arterioles throughout the body, causing a painful distention of the cavities of the heart; in diseases of the coronary arteries, in aortic lesions, and in aneurism; although it may occur in almost every form of heart disease. That it is associated with heightened tension seems undoubted. Here is Dr. Balfour's view of its causation:

"I believe myself to be justified in saying that in all probability the predisposing cause is anæmia of the cardiac plexus of general or local origin, and that the exciting cause is something which directly or reflexly still further cuts off the supply, or in some other mode injuriously influences the cardiac nerves. These exciting causes may be very various; in some it may be some trifling exertion, in others the depressing influence of tea, tobacco, the malarious poison, or any form of gastric irritation, and when the cardiac nerves are in a state of great irritability the most trifling cause may give rise to a severe paroxysm."

Angina pectoris usually comes on as a consequence of mental perturbation; or physical exertion; or of gastric derangements, such as distention. It may occur at any hour of the day or night. Sleep is the common time for such seizures, and death has not infrequently taken place during the night from this cause. The writer has found in his own practice that the favorite times for this occurrence at night are immediately after going to bed, which he ascribes to a chill in undressing raising the blood tension; about two hours after falling asleep, when sleep is deepest; and about four or five in the morning, when the circulation of the blood is most depressed.

The attack may be of very short duration, or it may last for a considerable time.

Treatment.—It is important that the bedroom and the bed should be comfortably warmed in the case of patients who have suffered, or who are likely to suffer from angina pectoris, so that all risk of chill may be avoided. Great attention should be paid to the digestive and excretory organs, so that derangements may be forestalled. Smoking and tea drinking must be discountenanced. Rest of body and peace of mind

are essentially necessary; the patient should be enjoined to live rather than to work. In short, the general regimen, diet, and medication should be regulated in accordance with the requirements of each individual case. The iodides are useful in relieving pain.

℞	Iod. potass.,	ʒ ij.–iv.
	Liq. arsen. sodii,	♏ ij.– ʒ i.
	Tinct. digital.,	ʒ i.
	Aq. chlorof.,	ad ℥ vi.

M. Sig. Take a tablespoonful in water three times a day.

The dose of the digitalis must be smaller than that which will raise the blood-pressure unduly.

The nitrites are efficacious in allaying pain and averting angina; nitro-glycerin may be given in doses of from two to four minims, of a one-per-cent solution; and in the nitrite of sodium in 2-grain doses three times a day. Both of these medicines are more slow in their action than the nitrite of amyl, but their effects are more lasting. When an attack supervenes, nitrite of amyl is the best remedy; from two to five minims should be inhaled quickly. Stimulants are likewise called for. Morphine is an invaluable remedy, speedily alleviating the distress, and promoting sleep.

Liegeois counsels against the use of antipyrine in angina pectoris, pointing out that as it is a vaso-motor constrictor it may aggravate the attack. (Phila. "Medical Times," 1888.)

The careful and judicious inhalation of chloroform or ether is sometimes serviceable. External applications of mustard plasters, or turpentine stupes, and a hot mustard foot bath, are useful adjuncts.

Mitral Insufficiency.—The symptoms are well marked. They depend mainly upon the engorgement of the venous and capillary systems with blood, while the arterial system is greatly impoverished. This leads to the overloading of all the organs of the body with blood. The lungs, liver, kidneys, etc., all suffer, and dropsical effusion into the cavities and subcutaneous tissue follows. There is usually gastric catarrh; and the digestive derangements which it and the hepatic disorders cause are detrimental to sleep. Palpitation is common. The pulmonary troubles being attended by breathlessness, frequently demand the sitting posture for the maintenance

of respiration. The pulse is small, soft, frequent, and irregular.

Sleeplessness is mainly due to passive congestion of the brain, which leads to mal-nutrition of the cerebral cells; and it is probable that sleep is still further disturbed by the irregularity of the blood-supply.

Such patients are often unable to fall asleep; they are breathless, and may suffer from Cheyne-Stokes' respiration. Exhausted to the last degree, they sit propped up in a chair or in bed, with heavy drooping eyelids,. gazing languidly around in despair. Upon attempting to sleep they nod for a moment and then awake with a start as if being suffocated, and with a terrified aspect. After a short time the process is repeated. If eventually they sleep, it is to start, twitch, and dream, and the dreams being of a horrible description, they awake in fright. In less pronounced cases, patients are apt to be aroused after an hour or two, when sleep is deepest, by attacks of palpitation and dyspnœa, which prevent the return of sleep for some hours.

Treatment.—The first indication is to secure rest for such a patient; he should be well propped up in bed to allow the heart as much room to beat as possible, and to favor the return of blood from the head; indeed, in bad cases the recumbent posture cannot be assumed. Everything likely to put a strain upon the heart or to enervate the nervous system must be avoided. The food should be light, nutritious, and as concentrated as possible. Alcohol may be given up to the point of improving digestion. The bowels must be kept active; for that purpose salines, as sodium sulphate or Carlsbad salts, with an occasional dose of calomel or blue pill, suit best. When dropsy is present, hydragogue cathartics, as elaterium, gamboge, or jalap, are required.

The best hypnotics are cardiac tonics.

℞	Tinct. digital., ...	ʒ ij.– ʒ iij.
	Liq. arsen., ...	ʒ ss.
	Acet. potass., ...	ʒ vi.
	Infus. scopar., ... ad	℥ xij.

M. Sig. Take two tablespoonfuls thrice daily between meals.

In some cases the following answers well:

℞ Tinct. ferri mur. (Ed. Ph.),	. . .	ʒ iv.
Hydrochlor. ammon.,	. . . .	ʒ iv.
Tinct. digital.,	. . . . .	ʒ ij.–iij.
Tinct. scill.,	. . . . .	ʒ iij.
Aq. chlorof.,	. . . . . ad	℥ vi.

M. Sig. Take a tablespoonful in water thrice daily.

Should the digitalis cause increased nausea or vomiting, strophanthus can be submitted for it. Convallaria, when it does not purge, frequently acts well.

℞ Ext. convall. maj.,	. . . . . fl.	ʒ ij.
Tinct. nucis vom.,	. . . . .	ʒ ij.
Tinct. scill.,	. . . . .	ʒ iij.
Syr. prun. virg.,	. . . . .	ʒ xij.
Aq. chlorof.,	. . . . . ad	℥ vi.

M. Sig. Take a tablespoonful in water every six hours.

The citrate of caffeine, in doses of 2 to 4 grains three times a day, is beneficial in some instances, particularly if it does not produce any increase of headache. It certainly tends to promote and improve sleep.

Occasionally these tonic remedies fail completely, so long as the dropsical effusion persists. For its removal mercurials and pilocarpine are useful, although draining the fluid off by means of incisions or Southey's tubes offers advantages.

Till the improvement sets in, when sleep naturally returns, hypnotics may be required. Morphine is the most reliable remedy. Dr. Clifford Allbutt called attention, some years ago, to the great value of hypodermic injections of morphine in these cases, allowing the patient to sleep by relieving the feeling of suffocation. Experience has confirmed his suggestion. The writer believes that in small doses it acts as a tonic to the heart, and therefore is a curative agent. The best dose to begin with is $\frac{1}{10}$ of a grain.

Chloral hydrate should be avoided as too depressing.

Paraldehyde and urethane are good and reliable remedies when morphine is contra-indicated.

The hypnotic properties of alcohol, and of diffusible stimulants, such as chloric ether and sal volatile, must not be overlooked.

Aortic Incompetence.—There is usually from the first some dilatation of the left ventricle, caused by the reflux of

blood, but a hypertrophic condition soon arises to compensate the defective arrangement. So long as the hypertrophy overcomes the incompetence things go on comfortably, but when it begins to fail, the left auricle is implicated, which in its turn dilates and hypertrophies, and pulmonary embarrassment ensues with all the characteristic symptoms of mitral regurgitation.

Sleep disturbance in the early stages is inconstant; when it does occur it is due to cerebral anæmia and to relaxed vascular tension. In the later stages, when the right side of the heart becomes involved, there is passive congestion superadded. Many such sufferers doze and sleep in their chair during the day. In the evening, quite overcome with sleep, they go to bed, but immediately on assuming the recumbent posture they become wakeful, and spend the night in watching. The other disturbing symptoms are palpitation, dyspnœa, cough, pain, angina pectoris, and gastralgia. They are of frequent occurence, and are peculiarly liable to come on during the night.

Treatment.—It is, in the main, similar to that of mitral insufficiency, but it demands even more care. The patient must be encouraged to live a quiet, regular, and uneventful life, all sudden and violent exertion being interdicted. Digitalis must be given more carefully than in mitral disease; the dose must be limited to that which will tone the cardiac muscle, to promote hypertrophy without slowing the heart's action. Iron and arsenic may be pushed, and everything done to improve the quality of the blood and the nutrition of the body.

For the promotion of sleep, morphine combined with atropine is most generally applicable. Urethane, paraldehyde, and sulphonal, in the order mentioned, are excellent remedies; it is, however, well to combine their use with some diffusible stimulant, as chloric ether, ammonia, camphor, or brandy.

In cases where the symptoms are not very pronounced, the administration of nitrite of amyl, or sodium nitrite, aids sleep. It is judicious to follow Dr. Lauder Brunton's advice, and direct that they should be taken only in the lying posture.

Fatty Degeneration of the Heart.—Sleeplessness may also depend upon fatty degeneration of the heart, which is not an unusual disease in the gouty, although it occurs under many other conditions, notably in diseases interfering with the coronary arteries, as well as in dilatations of the heart.

There may be no symptom of it at all, except dreaming and disturbed sleep, and its presence may remain unsuspected until death closes the scene. It is, however, more usual to have evidence upon which to hinge a provisional diagnosis of fatty degeneration of the heart. The aspect changes; the face becomes pale and anxious; the pupils exhibit the *arcus senilis;* the skin, pale and glossy, assumes perhaps even an unctuous appearance; the extremities are prone to become cold, especially at night; the temper changes, becoming variable and unreasonable, with feelings of weakness, and a tendency to giddiness and fainting on making any exertion. The heart's sounds are feeble; the first sound loses its distinctness, the impulse becoming diffused and less powerful; sensations of discomfort, which in some cases amount to pain in the cardiac region, are felt; the pulse, weak and irregular, is easily quickened by exertion, but, at rest, it may be exceedingly slow—30 to 40 per minute. Dyspnœa on exertion, with some lividity, readily occurs, and this may come on from sitting in a close atmosphere, so sensitive are these patients to the want of air; it may be excited even by indigestion. They sleep badly, dream, awake often, at times with well-marked dyspnœa, or with the feeling of want of air. They ascribe their awaking and asthma to the quality of the air in the room. They sleep with the door ajar.

Treatment.—As cardiac asthma is liable to be induced by digestive derangements, the food must be carefully regulated. Dry concentrated foods usually suit best; the last meal should be easy of digestion. Alcohol is beneficial in this form of sleeplessness, as it is in nocturnal asthma. There is truth in the old saying, that a man with a weak heart should be always near the brandy bottle, if seldom at it. The air of the sleeping apartment should be frequently changed, and maintained at an equable temperature. Repose of mind and body must be enjoined. The medicines worthy of the most confidence are arsenic, iron, digitalis, and strychnine. The bowels should be regularly moved. Sleep is promoted by the following:

℞	Spt. chloroform., ...	ʒ vij.
	Spt. ammon. arom., ...	ʒ vij.
	Tinct. bellad., ...	ʒ ij.

M. Sig. Take a teaspoonful in water every three hours.

Also by,

℞ Bicarb. sodii,	. . . . .	ʒ ij.
Tinct. lupul.,	. . . . .	ʒ xij.
Tinct. sumbul.,	. . . . .	ʒ xij.
Infus. serpentar.,	. . . . .	ad ℥ vi.

M. Sig. Take a tablespoonful in water at bedtime, and repeat if necessary.

Morphine in small doses is admissible, but chloral hydrate is best avoided.

Aortic Aneurism.—There is, perhaps, no disease which is attended by symptoms so diverse in their character and severity as aortic aneurism; there is no one in which sleep is more curiously influenced; nor any in which the want of sleep is more keenly felt.

So long as a patient with an aneurism of his aorta can sleep soundly, and remains free from pain, he maintains his appearance of health and his flesh and strength; but so soon as he becomes sleepless he grows worn and wan, he emaciates and loses his vigor, and the fatal termination is accelerated.

It may be that a patient so affected sleeps soundly during the whole course of the disease, for cases have occurred in which the patient's attention was first attracted to his condition by noticing a bulging and pulsating tumor under the skin of his chest wall.

In another group of cases, sleep is more (but not gravely) interfered with, where the aneurism is just above the aortic valves at the sinus of Valsalva.

In the majority of cases there is much suffering and sleeplessness, and these depend upon cardiac implication leading to circulatory derangements, pulmonary and bronchial implications, pain, and gastric and hepatic derangements. Aneurism is usually met with in those of sanguine temperament, and who have a hereditary tendency to disease of the heart and blood-vessels; and at the time when active and violent work is usually undertaken, from twenty to fifty years. It is much more frequently seen in males than in females.

The symptoms are due to pressure of the aneurismal tumor upon adjacent structures, and to changes in the heart itself. Pain is seldom absent; it ranges from mere discomfort within the thorax to constant and severe pain, which is either neural-

gic or anginal in character, its direction being determined by the nerves it affects directly or reflexly. It is increased by everything (as excitement) which tends to augment the size of the tumor.

Dyspnœa may be trivial and only noticeable on exertion, or it may amount to persistent orthopnœa, with violent paroxysmal exacerbations. It is caused by the condition of the heart, by pressure on nerves, or by mechanical interference with the respiratory tract. Nocturnal seizures interrupt sleep.

Treatment.—It must be held in recollection that many of these symptoms that disturb sleep, as pain, dyspnœa, etc., are instigated and aggravated by increased arterial pressure within the aneurism; it is therefore important that the intra-arterial tension should be reduced to, and kept at, the minimum. To accomplish this every effort must be made to secure absolute repose of both mind and body. Rest is the best remedy we possess. Reference was made to the fact (p. 595) that in one of Mr. Tufnell's cases the pulse fell, from this cause alone, fifty thousand beats in twenty-four hours. Paroxysmal attacks being influenced by position, it is necessary to give this point special attention, particularly when sleep is terminated by nocturnal seizures.

In the majority of cases the diet must be restricted. Mr. Tufnell's plan was to allow four ounces of liquid and six ounces of solid food at noon, and two ounces of liquids and four ounces of solids night and morning. This being a rigorous diet, it is seldom possible—even in hospital practice—to prevail upon patients to adopt it in its entirety. It affords, however, a good guide to the essential element of treatment.

In cases in which anæmia is pronounced, and in which the anæmia does not depend upon syphilis, when every texture of the body is calling loudly for oxygen, it must ever be a matter for anxious consideration, whether daily driving in the open air, generous diet, and a small quantity of red wine, does not tend to prolong life, more than rest and restricted diet.

As a rule, stimulants should be dispensed with; the bowels kept active that all straining at stool may be avoided. Iodide of potassium, besides being curative, possesses sedative properties of a very high order, soothing pain, relieving breathlessness, and frequently promoting sleep. Most patients bear thirty grains three times a day.

Antipyrine has lately been recommended by Professor Germain Sée, as possessing the power of quieting the heart, and so favoring coagulation, as well as alleviating distressing thoracic pain and cardiac oppression resembling angina pectoris. The writer's experience of its use in a recent case was not encouraging; it appeared to increase the distress by augmenting the arterial tension. Dr. Dujardin-Beaumetz concurs with Professor Sée, but prefers phenacetin, which he says acts as an analgesic in half the doses of antipyrine, and he adds that it is not poisonous.

Individual symptoms require in many cases special treatment. Pain is occasionally relieved by cold to the chest; at other times by moderate bleedings; and also by anodyne liniments. Dyspnœa yields to the inhalation of chloroform or more quickly, perhaps, to the hypodermic injection of morphine. When a special hypnotic is required morphine is the drug.

CHAPTER XIII.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE RESPIRATORY SYSTEM.

INSOMNIA is a symptom of many diseases of the respiratory system, in some cases entailing merely increased discomfort, in others, particularly when pronounced, undoubtedly exercising a prejudicial influence over the course and termination of the illness.

It is a matter of common clinical experience that many cases of pneumonia and bronchitis, in which sleeplessness is a prominent symptom, do not improve until sleep takes place, either naturally or as the result of the administration of drugs. During sleep the movements of the lungs are curtailed, the amount of inspired air is diminished, the blood-supply is lessened, and recuperation takes place in the heart and nervous system, all of which tend to promote recovery. The embarrassed lungs and bronchial tubes improve under the influence of the repose in a very remarkable way.

Sleep can often be secured by relieving the conditions upon which the insomnia primarily depends, but it must be borne in mind that in every case the cerebral circulation is modified secondarily in some degree, and that the selection of remedial agents should be guided by the nature of these modifications. Successful treatment demands that these side issues be considered with the same care as that bestowed upon the disease itself.

Sleeplessness, although one of the symptoms of the diseases under consideration, is in reality in many cases a precautionary arrangement for the preservation of life. It enables the patient to bring to the aid of the respiratory muscles all the voluntary help he possesses to assist in carrying on the work of respiration. It is therefore apparent that it must not be interfered with recklessly, for in such instances as those just referred to, the induction of sleep would speedily end in that

from which there is no waking. In no class of diseases is it more needful to remember the advice of the father of physic to "do no harm."

It is proposed to review some of the causes which disturb sleep in respiratory diseases; to refer to the abnormal conditions in the nervous system which these instigate and perpetuate; and to suggest treatment which has been found reliable in practice.

Causes which disturb sleep. Among these must be enumerated cough, dyspnœa, pain, and increased temperature.

Regarding cough we may premise that it depends upon impressions conveyed by afferent nerves to the centres in the medulla oblongata which preside over coughing. These may originate in the terminal endings of the nerves in almost any organ, or in the cutaneous or mucous surface of the body. We know, for example, that diseases of the teeth, ear, or nose are all provocative of cough, not to speak of the latter being fruitful sources of asthmatic seizures. Similar causes, acting in other parts of the body, may reflexly excite cough.

The characteristics of irritative cough are, that it is extremely frequent, spasmodic, and paroxysmal, and not accompanied (for obvious reasons) by expectoration. It is peculiarly liable to disturb sleep. When the terminal endings of the nerves in the respiratory tract are unduly sensitive, this description of cough is often excited by cold and dust-laden air; these excitants are also the source of asthmatic attacks.

We are here concerned only with cough as it is excited by abnormal conditions in the respiratory system. In ordinary circumstances it is designed for the expulsion, from the respiratory tract, of foreign materials, or of secretions when these are formed in abnormal quantity. During sleep, when the centres for coughing are in a state of repose, they fail to respond to sensations which in waking moments would induce the reflex act.

It requires a more powerful stimulus, or, in other words, a larger accumulation of mucus in the tubes, to excite cough, although when this does occur coughing may be unusually severe on account of the greater quantity of material to be got rid of.

When the mucous membrane of the bronchial tract is unduly sensitive and irritable, the most trifling provocations

initiate sensations which are transmitted in an exaggerated way, giving rise to a dry, irritating cough, which accomplishes no useful purpose. This often occurs in the first stages of bronchitis and whooping cough when the tubes are hyperæmic, in the early stages of pneumonia and phthisis pulmonalis, and in laryngeal phthisis when the nerves are implicated.

Superfluous cough of this kind is a frequent source of sleeplessness, and it may most safely and advantageously be subdued.

It is different, however, when cough is perpetuated by abundant secretion, as in the advanced stages of bronchitis and phthisis pulmonalis. Here the accumulation may excite so much coughing as to prevent the onset of sleep, or if sleep has supervened it may interrupt it temporarily, in order, if possible, to clear the bronchi. When cough is out of proportion to the work done, the excess, as it were, may be cautiously curtailed, so that its frequency and severity may bear some relation to the amount of expectoration.

In cases in which secretion is profuse, and where the patient's whole energies are required for breathing and expectorating, to induce sleep would be to run the risk of bringing about fatal asphyxia.

Severe paroxysmal coughing is occasionally due to exhaustion and undue irritability of the medullary centres, for although instigated by peripheral irritation the excitability persists, and the reflex act continues long after the necessity for it has passed away. Under certain circumstances, as, *e.g.*, in some cases of whooping cough and pulmonary phthisis, this abnormal excitability exists, and the slightest stimuli, such as those caused by draughts or by changes of temperature, are sufficient to set up paroxysms of coughing.

Irritability of the nervous centre which governs the act of coughing is exceedingly apt to spread to those in its immediate neighborhood, namely, the centres for vomiting and sweating, and the vaso-motor and cardiac centres. This explains the vomiting which in pertussis and phthisis pulmonalis so frequently terminates a fit of coughing; and, to a certain extent, the perspiration which is such a prominent symptom in the latter disease. The vaso-motor centres implicated in this way, initiate hyperæmic conditions of the brain, that the patient may be kept awake to cough. When cough is very

severe, as in pertussis, passive cerebral congestion occurs, which is unfavorable both to sleep and to the proper nourishment of the brain. The lividity of the face during severe fits of coughing in this disease testifies to the extent of the venous congestion present.

Dyspnœa in diseases of the respiratory apparatus depends upon many causes, and it may be slight and constant, or severe and paroxysmal. It is sometimes due to constriction of the lumen of the respiratory tract, as in croup, in which the inspirations are prolonged and stridulous, and the urgency so distressing as to be almost incompatible with sleep. As a rule, the difficulty of breathing in such instances bears some relation to the obstruction to be overcome.

Dyspnœa from obstruction may also be paroxysmal, and if so, is almost always neurosal, and therefore specially liable to develop during sleep, and to interrupt it. This is the case in the sudden seizures of laryngismus, where the spasm narrows the larynx, impedes respiration, and causes the breathing to be stridulous and crowing; likewise, in false croup, which closely simulates genuine croup in its dyspnœal symptoms; and also in asthma. In this last disease, the spasm contracting the lumen of the bronchial tubes occasions laborious breathing and wheezing, accompanying both expiration and inspiration. The expirations are so unduly prolonged, and the distress so great altogether, as to necessitate the sitting posture, during which sleep is generally impossible. Dyspnœa is less pronounced in emphysema, in which it may amount merely to a prolongation of the expiration, with shortness of breath, increased upon exertion; but it is more marked in bronchitis, in which there is a sense of constriction, oppression, and suffocation, with labored breathing.

Dyspnœa is increased by the venosity of the blood circulating through the respiratory centres. This depends primarily upon defective aeration of the blood, as in emphysema, in which duskiness of the lips and face is seldom absent. It is not unusual in severe bronchitis with profuse secretion, and although not often met with in phthisis pulmonalis, except as the result of some complication, it is sometimes seen toward the termination of the disease, when it may be so exaggerated as to cause the patient to struggle for breath. Increased temperature of the body invariably quickens the pulse and

respirations, and, when present, helps to increase the rapidity of the breathing due to other causes. Implication of the lung tissue, as in phthisis pulmonalis and pneumonia, always occasions an increased frequency of the respirations, in order to compensate for the deficient aeration of the blood. It must not be forgotten, however, as Cohnheim pointed out, that after the crisis in pneumonia, when the temperature falls, all the symptoms are alleviated, and the respirations become normal, while the lung is still hepatized to the same extent as before the defervescence took place. Of equal importance are those cases depending on interference with the expansion of the lung, as in pleuritic effusions, etc., and those associated with pain, such as pleurisy and pleuro-pneumonia, where the respirations are voluntarily diminished in depth, and consequently increased in frequency.

Pain is another of the symptoms in connection with respiratory disease which often exercises a disturbing influence on sleep. It quickens the pulse and induces hyperæmia of the brain. The pain is usually increased by coughing, deep inspiration and movements, explaining the instinctive desire patients have to inhibit the centres for coughing, and so suppress cough voluntarily. It varies in character from the substernal pain of bronchitis to the sharp and piercing pain of pleurisy, and to the severe pain of a central pneumonia, in which the portion of lung inflamed gives rise to considerable tension on the neighboring parts, impressing the nervous system unfavorably. Such cases are difficult of diagnosis, percussion failing to elicit a dull note, or auscultation to detect any abnormal sounds, until the inflammation makes its way to the surface. Sleeplessness in such cases is very pronounced.

Increased body temperature, as a rule, disturbs sleep, mainly in proportion to its height; it is thus more frequently a source of sleeplessness in pneumonia and acute phthisis pulmonalis than in other cases, for in the former it ranges from 103° to 105° Fahr., and in the latter it reaches 105° Fahr. or more; and these patients often do not sleep until four, five, or six A.M., when the fever remits. In bronchitis, even capillary, it seldom exceeds 101° to 103° Fahr., the pulse being rapid in proportion to the fever. And it is equally true of pleurisy that the temperature is not high in ratio to the other symptoms.

It might here be added that the night sweats of phthisis are most apt to come on during sound sleep, whether by day or by night, thus accounting for their frequent occurrence toward morning, when the remission of the fever admits of sleep. They are always more common and more profuse when coughing is unusually severe, and they tend to shorten sleep, and prevent its recurrence when it has been once disturbed. Dr. Graves wrote: "It is between three and five o'clock in the morning that the inclination to sleep is strongest; it is about this time that sentinels are most apt to slumber at their posts, and consequently attacks upon camps or cities, made with the intention of effecting a surprise, are usually undertaken about this period of the morning. How well marked is the periodic tendency to sleep at this hour, in all patients laboring under hectic fever, produced by whatever cause! How often do we hear the poor sufferer complain of restlessly tossing about in his bed until three or four o'clock in the morning, when at last sleep, welcome although uneasy, for a few hours separates the patient from his pains!" This sleep is amply accounted for by the remission of the fever and the lowering of the circulation, which usually happen at that hour.

The abnormal modifications of the nervous system which are induced by respiratory diseases, and upon which disturbed sleep really depends, will be best noted under the heading of the various diseases, and treatment will also be thus considered.

Whooping Cough.—In the first stage, that of invasion, when the symptoms resemble those of an ordinary catarrh or bronchitis according to their severity, disturbed sleep and dreams are due to hyperæmia of the brain. In the second stage, when the characteristic cough becomes the marked feature of the disease, there is passive congestion of the brain, which, besides causing sleeplessness, accounts for the number of cerebral affections which complicate the complaint. In the last stage, when the paroxysms become less frequent and severe, and when the patient often exhibits symptoms of exhaustion, impaired sleep is due to anæmia of the brain, and night-terrors not infrequently ensue.

Treatment.—The first thing is to secure satisfactory conditions of sleep. We have seen that irritable nerves transmit

impressions very readily; hence the necessity for avoiding draughts of cold air and all impurities of atmosphere. The room should be thoroughly ventilated, the temperature maintained at 65° Fahr., and the air laden with a certain amount of moisture from a steam kettle. This applies to all acute diseases of the bronchial tubes. In whooping cough it is specially important to avoid all draughts. Dr. Eustace Smith writes: "The paroxysms are often most frequent and severe at night when the child is asleep. The slightest movement of air across the face, such as is produced by a person walking near the cot, will often excite an attack. These night seizures can usually be greatly reduced in number by an expedient suggested, I believe, originally by Dr. Marshall Hall. It consists in throwing a fine muslin curtain over the cot at night-time. The simplest plan is to have a couple of hoops arranged at the ends of the cot, like the 'tilts' of a wagon, so as to support the curtain at a sufficient height. This arrangement, which corresponds to the mosquito curtain used in hot climates, does not interfere with a free supply of oxygen, while it effectually stops all wandering currents of air. So protected, a child will often sleep the night through without an attack."

In the first stage the general treatment must be derivative and depressant; expectorants with salines, and counter-irritants, as mustard and linseed meal poultices, being useful. Sleep is best induced by potassium bromide and chloral hydrate.

In the second stage, when the quantity of secretion is not abundant, the centres for cough require to be soothed. The bromides and belladonna are here specially called for. It is curious to notice that the best remedy varies with the epidemic; what suits well in one, fails in another; while the remedy that answers well in any given epidemic often does so in all the cases. To get good from medicines they must be pushed. In the case of belladonna, it is often marvellous to note the improvement which follows the production of noisy and hilarious delirium and dilatation of the pupils—the physiological effects of the drug. Grindelia is also a useful drug. When there is much secretion, the nightly administration of an emetic, such as sulphate of zinc or sulphate of copper, acts as an excellent hypnotic. The passive congestion of the brain

is best treated by carbonate of ammonia and digitalis, and stimulants, as alcohol and musk. For a child a year old:

℞	Tinct. digital.,	♁i. to ʒ ss.
	Carb. ammon.,	gr. x.
	Spt. chlorof.,	ʒ ss.
	Syr. tolu.,	ʒ i.
	Aquam,	ad ℥ ij.

M. Sig. Give a teaspoonful three or four times a day, in a little water.

Two or three drops of tincture of musk (U.S.P.) may be added to each dose when there is much depression. Antipyrine is said to answer well in such patients; it may be by raising the blood-pressure. Paroxysmal attacks of cough may be alleviated by the inhalation of chloroform. So advantageous is this that children, after experiencing its benefits, will not leave one room for another until they ascertain that the nurse has with her the bottle containing it. A few drops sprinkled upon a handkerchief should be held to the nostrils. It must be borne in mind that the fewer the fits of coughing the less is the passive cerebral congestion, and the better the sleep. If any hypnotic is required, chloral hydrate and paraldehyde are suitable, the difficulty with the latter being its taste.

In the last stage, when the paroxysmal cough is subsiding, and anæmia of the brain replaces passive congestion, iron, quinine, and alcohol are the best hypnotics. Steel wine and the glycerin of dialyzed iron answer well, while change of air acts beneficially. Monobromide of camphor and belladonna are occasionally valuable agents.

Bronchitis.—Disturbed sleep depends largely upon the severity of the disease, or, in other words, upon the extent to which the smaller tubes are implicated; and it is due in the earlier stages to hyperæmia, and in the more advanced stages to passive congestion of the brain.

Treatment.—This at first must be derivative and depressing in the majority of cases. Hot poultices of linseed meal, sprinkled with cayenne pepper or mixed with mustard, or turpentine stupes, should be applied to the chest and back for a short time, at least twice in twenty-four hours; the chest

being protected in the interval with a swansdown, or extra flannel, jacket. Flying blisters applied to the limbs are useful auxiliaries. They are decided aids to sleep. It should be remembered that, in some animals whose skulls had been trephined, Schüler saw the arteries of the pia mater contract subsequent to the application of mustard to the abdomen.

Dry cupping the back and chest and a saline purgative are useful expedients for depleting the brain and bronchial tubes simultaneously. Tartar emetic or ipecacuanha, with nitrate of potash in Mindererus' spirit, should be given every three or four hours. In the gouty the following answers well:

℞	Vini antim.,	ʒ ij.
	Vini colch.,	ʒ ij.
	Liq. potass.,	ʒ ij.
	Tinct. camph. co.,	℥ i.
	Aq. menth. pip.,	ad ℥ vi.

M. Sig. Take a tablespoonful every three or four hours, in water.

In the early stages, when cough is not required for the purpose of expelling phlegm, it should be curtailed. An occasional dose of codeine effects this, and it is often sufficient to induce sleep.

℞	Syr. codeinæ,	℥ iss.
	Acid. hydrocy. dil.,	♏ xxiv.
	Spt. chlorof.,	ʒ ss.

M. Sig. Take a teaspoonful in water every two hours when required for the cough.

If sleep be not induced, two teaspoonfuls of the syrup of chloral hydrate can be given at bedtime, and repeated in two hours if necessary. Urethane is also admissible in doses of from 20 to 30 grains, or 10 grains of Dover's powder; the disadvantage of the latter being its tendency to derange the secretions and to constipate the bowels.

When the bronchial secretion becomes abundant, cough, being a conservative measure, must not be allayed; on the contrary, its expelling power should be improved, if possible, by the administration of stimulants. Carbonate of ammonia and nux vomica are useful remedies.

℞ Iodid. potass., ... ʒ i.
Carb. ammon., ... ʒ i.
Tinct. nucis vomic., ... ʒ i.
Syr. prun. virg., ... ℥ iss.
Aq. chlorof., ... ad ℥ vi.
M. Sig. Take a tablespoonful every three hours.

To procure sleep at the cost of checking cough would obviously be highly improper.

If the secretion be very profuse, an emetic at bedtime is the only admissible hypnotic. For the adult the most suitable emetic is sulphate of zinc or of copper; for the child subsulphate of mercury. If sleep does not ensue, it is generally safe to give a dose of paraldehyde or urethane immediately after the tubes have been emptied. Opiates are contra-indicated, particularly in the young and aged.

Should the disease linger on, efforts must be made to check the formation of the secretion, to sustain the strength of the patient, and to increase the efficiency of the cough. The mineral acids, terebene, quebracho, tar, the benzoates, sal ammoniac, ammoniacum, yerba-santa, quillaya saponaria, are all useful—turpentine especially so. The late Dr. Warburton Begbie, describing a case of severe bronchitis, attended by excessive accumulation of secretion in the bronchial tubes, wrote: "An emetic suggests itself as a likely means of affording relief, but the frequent feeble pulse, and the clammy surface of the body, with features almost collapsed, and livid lips, forbid its employment. Turpentine is then an alternative remedy, and it is a safe one; given internally and diligently applied externally, it will not unfrequently reward the confidence which has been placed in it."

In like cases, sulphuric ether injected hypodermically in ʒ ss. doses frequently affords good result, strengthening the heart, augmenting the expelling powers of the cough, and eventually inducing restorative sleep. Alcohol in its various forms may be given freely in this condition.

Chronic bronchitis is benefited and sleep improved by Turkish baths, and by change of residence to a suitable climate.

Asthma.—Sleep in this neurosal affection is prevented by the extreme difficulty in breathing, and by the passive congestion of the brain to which it conduces. The following re-

marks do not refer to cardiac or anæmic asthma, or that which pertains to gout.

Treatment.—At the onset of the attack the best remedies are morphine, gr. ¼ to gr. ⅓, with atropine, gr. $\frac{1}{100}$ by hypodermic injection, and an inhalation of nitrite of amyl (♏ iij.), or of chloroform. Next in order are chloral hydrate ʒ ss., and potassium bromide ʒ ss., taken in the form of a draught, and the inhalation of the fumes of Himrod's cure, or of Martindale's pulvis lobeliæ compositus. The extractum grindeliæ liquidum, B.P.C., in doses ranging from ♏ x. to ♏ xxx., or the tincture of lobelia in doses from ♏ x. to ♏ xxx., may both be advantageously employed. The depressing effects of the latter are such as to require that its action should be watched.

Massage of the spine sometimes shortens and alleviates the attacks, and deserves more attention than it has hitherto received.

In the intervals between the attacks, when the sleep habit is poor, the treatment to be recommended requires consideration. When the malady is reflexly occasioned by bronchitic or catarrhal affections of the respiratory tract; by gastric or intestinal derangements; by conditions arising out of a disordered metabolism; or by abnormal states of the nasal cavities, attention must be directed to the relief of these exciting causes. When it results from an inherent proclivity (idiopathic?) to the disease, either inherited or otherwise, *e.g.*, induced by malarial poison, the climatic conditions under which the patient lives demand careful investigation.

Some patients sleep best in densely-crowded cities, others in the country; many sleep badly at the seaside. Their experience in this respect is of the first importance in determining a suitable residence, for no climate, however salubrious, will afford benefit unless sleep be sound and undisturbed.

Many weakly subjects improve by sojourning for some months at the Cape, in Egypt, and in the Riviera, not too near the coast. Others, who have a tendency to obesity, are benefited by periodic visits to one or other of the spas, either at home or abroad. Electricity has rendered good service in some cases, particularly in those of purely neurosal origin.

In all cases attention must be paid to the digestive functions, and Turkish baths advised, in selected cases, with a view to improve the sleeping habit.

The prolonged use of iodide of potassium with arsenic, or of small doses of sodium nitrite or nitro-glycerin, improves sleep, and acts as a prophylactic. Paraldehyde and urethane are eligible hypnotics for temporary relief.

Hay Fever.—In this affection sleep is much disturbed by asthmatic attacks, arising from the irritant action which the pollen of grasses sets up in the mucous membrane of the eyes, nose, and respiratory tract. It must not be forgotten that those afflicted with this affection are often gouty and neurotic.

Treatment.—Those who are liable to this complaint should at all times live carefully, but especially so in spring. This is desirable for the purpose of maintaining their general health at the highest possible point, so that their bodies may be as little vulnerable as possible. The weakly often benefit from a course of arsenic or quinine; the plethoric from ammonium chloride or potassium iodide. The diathesis must be narrowly studied.

When the season for an attack is due, a residence at the seaside or in a large city is desirable; although in a very dry hot summer the quantity of fine dust constantly floating about in the atmosphere of a city is provocative of asthmatic seizures.

When the attack supervenes the fluid extract of grindelia robusta and chloral hydrate are the best remedies. Locally, swabbing the nostrils with a solution of cocaine, menthol and iodine in vaseline oil, carbolic douching, and the use of carbolized smelling salts, are probably the drugs which afford the most relief.

Emphysema.— This frequently follows in the train of repeated attacks of bronchitis and asthma, as well as whooping cough, and old standing tubercular disease, and is often complicated by sleeplessness, depending upon slight passive congestion of the brain, which becomes more pronounced when the heart gets involved.

Treatment.—In the early stages, careful feeding, avoidance of cold, the administration of arsenic, strychine, and cod-liver oil, with discreetly regulated Turkish baths at stated intervals, will improve sleep, and indeed the patient's whole tone. In the later stages, where the heart is affected, mercurials, combined with salines and diuretics, to deplete the circulation, occasionally afford relief. Tonics, such as digitalis and

strychnine or nux vomica, together with a stimulant, are the safest and most efficacious hypnotics.

℞	Tinct. digital.,	ʒ ij.
	Liq. strychnin.,	ʒ i.
	Tinct. serpentar.,	ʒ xij.
	Aq. chlorof.,	ad ℥ vi.

M. Sig. Take a tablespoonful thrice daily in water.

Alcohol may be allowed at bedtime, and the patient should be advised to sleep with a high pillow, to facilitate the return of the venous blood from the head. Paraldehyde is probably the best hypnotic we possess at present for this malady.

Pneumonia.—Croupous or lobar. Insomnia, in this disease, depends at the onset upon increased vascular tension in the cerebral circulation; during its course, upon passive congestion; and toward the termination, upon anæmia of the brain with decreased vascular pressure.

Treatment.—The observation of Cohnheim (page 740) affords a good indication for the treatment of this insomnia. As a clinical fact sleep is best secured by lowering the temperature. The application of cold also acts on the cerebral circulation. Schüler observed that cold compresses and the cold pack produced, at first, dilatation of the arteries of the pia mater, but afterward, contraction of these vessels—a condition favorable for sleep.

In the young and strong, the application of cold iced cloths to the chest, frequently changed, fulfils these conditions, particularly if quinine and aconite be administered concurrently. Aconite possesses the power of lessening the conductivity of the sensory nerves, and this, by relieving pain, conduces to sleep.

℞	Sulph. quinin.,	gr. xx.
	Ext. aconit.,	gr. i.

Ft. pil. iv. Sig. Take two at four and six P.M.

At the onset, opium with antimony is a suitable and useful combination. However, when there is much secretion, and when the respirations are irregular and shallow, opiates must be cautiously used. Antipyrine, given in 15-grain doses every hour for four or six hours, serves a similar purpose, although it acts less satisfactorily when the arterial tension is very marked.

In the debilitated and aged, hot poultices may be applied to the affected side, and a mixture something like the following given:

℞ Carb. ammon., ... ʒ i.
Tinct. belladon., ... ʒ i. vel ʒ iss.
Liq. strychn., ... ʒ i.
Infus. serpentar., ... ad ℥ vi.
M. Sig. Take a tablespoonful every four hours in water.

When special remedies are required to promote sleep, chloral hydrate with potassium bromide, or paraldehyde alone, may be prescribed during the first few days; and in the later stages, morphine, gr. $\frac{1}{6}$ to $\frac{1}{4}$, with atropine, gr. $\frac{1}{100}$, an hour before bedtime. Sponging the body with tepid water, and a timely dose of alcohol with a light meal, are often followed by refreshing sleep.

In grave cases, occurring particularly among the aged, and in those who have lived freely, cardiac exhaustion endangers life. The symptoms are a running, irregular, and intermitting pulse, 140 to 180, quickened respirations, 50 to 60, and sometimes a temperature of 105° to 106° Fahr. The sufferer being anxious and distressed, if he sleeps it is to mutter and talk for a few moments, and then to waken with a start. Opiates are out of the question. Such cases are too weak to sleep. Sulphuric ether injected hypodermically will often, in these cases, slow and steady the pulse, strengthen the heart, lower the temperature, moderate the respirations, increase the power to expectorate, and bring about peaceful sleep. The writer has repeatedly seen apparently hopeless cases recover under this treatment. In very urgent cases it must be injected every hour. Alcohol and musk may be given at the same time by the mouth.

Phthisis Pulmonalis.—Dreams of a terrifying nature and disturbed sleep are among the many premonitory symptoms of this disease. So substantially true is this, that the writer has been able frequently to rightly predict, from their occurrence, the onset of the disease, while as yet no other symptom appeared to justify the diagnosis. They depend largely upon the anæmia and digestive derangements which so frequently prelude it, and initiate irritability in the cerebral cells.

Treatment.—Besides attending to digestion, nutrition, and

decubitus (which latter should be that instinctively chosen by the patient) the cough must be curtailed to the point of usefulness. Codeine answers well and does not derange the digestive processes like opium or morphine—a most essential attribute in a debilitating disease.

℞ Codeinæ,	. . . . .	gr. iij. vel gr. iv.
Acid. hydrocyan. dil.,	. . . . .	♏ xxiv.
Acid. phosphor. dil.,	. . . . .	ʒ i.
Glycerin.,	. . . . .	ʒ vi.
Aq. chlorof.,	. . . . .	ad ℥ vi.

M. Sig. Take a tablespoonful when the cough is troublesome, and repeat if required every two or three hours.

For a time this seldom fails to soothe and admit of sleep. Where it is insufficient, ten grains of chloral hydrate, or one of the following, may be given at bedtime: ten to fifteen minims of chlorodyne; ʒ ss. of the ammoniated tincture of opium (Scotch paregoric elixir); ʒ ss. to ʒ i. of compound tincture of camphor (English paregoric); each separately acts in different cases satisfactorily. Occasionally it may answer the purpose to give a morphine or cocaine lozenge, or better still a few whiffs of chloroform. Alcohol at bedtime, with a flying blister of mustard or turpentine, is worthy of a trial. When the expectoration is copious, care must be taken not to interfere further than to allay the superfluous coughing. Much may be done by controlling the bulk of the sputum and by strengthening the powers of expulsion. The acids with squills and strychnine, or cubebs with wild cherry and terebene, are both suitable combinations. When a direct hypnotic is called for to obtain sleep, either paraldehyde or urethane may be given.

When fever runs high it must be controlled. Quinine acts as a hypnotic.

℞ Sulph. quinin.,	. . . . .	gr. viij.
Pulv. digital.,	. . . . .	gr. i.
Ext. opii,	. . . . .	gr. ¼.

Ft. pil. ij. Sig. Take at four P.M. and repeat at 6 P.M.

The application of cold-water cloths for an hour or two before bedtime answers the same end.

In chronic cases the administration of six grains of anti-

febrine, about four and six P.M., with free sponging with tepid water at bedtime, is conducive to sleep. The inunction of cocoa-nut oil is useful, the friction appearing to promote sleep. Dyspnœa in this disease is most speedily relieved by the hypodermic injection of sulphuric ether.

Hæmoptysis very frequently supervenes during sleep.

Pleuritis.—Insomnia is due chiefly to cerebral hyperæmia in the early stages, and to anæmia in the later. It is sometimes one of the few symptoms of latent pleurisy, and may even be the only one.

Treatment.—Attention to decubitus. At first, relief from pain (by restricting movement) is gained by lying upon the affected side, an end which may also be attained by the application of a firm bandage. In the more advanced stages propping up the patient in bed often promotes sleep. The treatment must be decidedly antiphlogistic. Morphine, with or without atropine, is the only reliable hypnotic, and effusion is no bar to its use; the dose ought to be as small as is compatible with the end to be attained. Paracentesis is invariably followed by improved sleep.

Laryngismus Stridulus.—This neurosal affection frequently interrupts sleep at its deepest. It occurs in those possessing unstable nervous systems, whether inherited or induced by mal-nutrition, such as arises from improper feeding, *e.g.*, poor milk, or an excess of starchy food; and unhealthy surroundings. In this debilitated state there is a tendency to explosive attacks when the respiratory centres are slumbering deeply, and these are easily excited by reflex irritations, such as teething, gastric derangements, worms, etc. The inherent weakness in the cerebral textures renders these infants at all times restless and fitful sleepers, awaking often and crying. The affection is most frequently met with in rickety children, and also in the victims of hereditary syphilis.

Treatment.—This naturally divides itself under three heads. The first includes the removal of the exciting cause, and attention to the tone of the nervous system, by means of hygiene, proper food, tonics, etc.; the second embraces the adoption of prophylactic measures, such as the cold bath, sponging the throat several times a day with cold water, administering a nightly dose of potassium bromide and chloral hydrate, which children bear well, attending to the ventilation of the bed-

room and to the bed-clothing, etc.; the third deals with the attack itself. The writer has been accustomed to advise that the nurse should always have at hand a basin containing cold water and a sponge, and a phial of one part of chloroform mixed with three parts of spirits of wine, that the former may be immediately dashed over the face and chest, and a few drops of the latter sprinkled on a handkerchief and held to the nostrils. Nitrite of amyl may also be used. In very young children smelling salts may be substituted for the chloroform. In severe cases musk and ammonia are excellent remedies. Opiates are usually injurious. Cod-liver oil usually affords good results when given between the seizures.

Spurious Croup.—This malady occurs in the same class of patients, and by many is considered to be one and the same disease; it attacks those of older years, from one to seven. It invariably comes on at night, during the first two hours of sleep, when it is deepest. The child suddenly awakes gasping for breath, flushed, distressed, and alarmed; tosses about as if looking for relief, and not finding it, cries. The attack does not usually last more than half an hour, though it may recur the same night when sleep again becomes sound, and it almost always does so on the succeeding nights. At times it is preceded by catarrhal conditions of the nostrils and throat. This is a catarrhal affection with a neurosal element superadded.

Treatment.—This consists in affording relief at the time, and subsequently attending to the general condition of the patient. Two or more grains of the subsulphate of mercury in a teaspoonful of water induces emesis rapidly, and the application of hot poultices, or a hot sponge to the throat for half an hour, often suffices to relieve the cough and distress, and to render the breathing easy and comfortable. If it does not, the cautious administration of minute doses of aconite is desirable. The after-treatment consists in the use of tepid salt-water baths and suitable tonics.

CHAPTER XIV.

INSOMNIA DEPENDING UPON FEBRILE AND GENERAL DISEASES.

THE constitutional disturbance which arises from the various specific fevers invariably affects the nervous system. In a large percentage of cases this is apparent in the stage of invasion, by depression, headache, and sleeplessness; throughout the course of the fever, by disturbed sleep and delirium, more rarely by convulsions and coma; and occasionally, in convalescence (*e.g.*, in enteric fever), by mental enfeeblement, and in some instances by well-marked insomnia.

Sleeplessness usually depends in the earliest stage upon circulatory derangements; and subsequently, upon an enfeebled state of the cerebral cells, brought about by defective nutrition.

At the onset of the fever there is, in most cases, anæmia of the brain with increased vascular tension, the blood-vessels being tonically contracted and the pulse hard and incompressible. Cerebral irritation thus induced gives rise to headache, sensory derangements, restlessness and sleeplessness, followed or accompanied by profound malaise, and muscular and articular pain. In children, convulsions may occur, particularly in measles, without any serious after-effects. The anæmia of the cutaneous surface, rendering it unduly sensitive to all impressions, occasions the sensations of chilliness and shivering.

This state is replaced after a time, longer or shorter, by a reversed condition of things, in which the blood reaches the brain and surface through relaxed blood-vessels (and with lowered tension). The temperature of the body, increasing from the beginning up to its maximum, causes much heat to be given off by the skin, which feels dry and pungent. The pulse becomes quicker, fuller, and softer. In this stage the brain and nervous system are practically starved. A rapid

circulation being at all times badly adapted for the removal of the waste products from, and for the supply of healthy pabulum to, the tissues, it is still more embarrassed in the discharge of its functions by being surcharged with morbid materials, inseparable from an enormously increased tissue metamorphosis; and, it may be, with those elementary and poisonous substances which initiate the disorder.

The effects of this starvation are displayed in prostration, mild delirium, restlessness, and sleeplessness; and in grave cases, by convulsions and coma.

Toward the termination of the fever the heart becomes feeble, the pulse quicker and dicrotic, and, coincidently, the nervous system is more profoundly exhausted.

In no class of cases is sleep of more importance, the want of it influencing the course and termination of the diseases most unfavorably. The late Dr. Murchison wrote: "The practitioner cannot be too forcibly impressed with the fact that loss of sleep, at any stage of typhus, if it continue for two or three nights, is of itself sufficient to kill." On the other hand, sleep, even of limited duration, never fails to act beneficially; to secure it for a patient is in many instances tantamount to insuring his recovery. Sleeplessness may be taken as an indication of the gravity of the disease, particularly if it resist treatment. It must, of course, be borne in mind that the greatest differences exist in the ability of patients to sleep under feverish conditions; those possessing excitable and impressionable nervous systems sleeping very badly. It is therefore doubly important to promote sleep in their case.

To illustrate the management of insomnia in febrile conditions it is proposed to discuss the symptoms of typhus and enteric fevers at some length, those of measles and scarlet fever being alluded to very briefly.

Typhus Fever.—As the full brunt of typhus fever is borne by the nervous system, sleep disturbance of a severe nature is of frequent occurrence. The invasion is usually sudden, obliging the patient to relinquish his occupation and betake himself to bed. He complains of headache, great depression, and of articular and muscular pain. Sleeplessness is present more or less throughout the illness. Among the other symptoms are, a pulse full at first (less hard than an ordinary febrile

pulse), afterward full and soft; a high temperature; and a scanty flow of urine, containing a greatly increased quantity of urea. When the vascular tension relaxes, the headache disappears and gives place, in a well-marked case, to muttering delirium, the patient lying in an apathetic state, with his intellect clouded and confused, answering questions slowly, if at all; or his delirium may be excited, though it is usually less so than that of delirium tremens; or he may gravitate into the condition known as *coma vigil*, and lie with his eyes wide open, apparently unconscious of all that is going on, and picking at the bed clothes, etc.

It will be useful to inquire into the condition of the brain and nervous system in this disease with reference to sleep. After death the brain has been found atrophied, and the subarachnoidal fluid increased. In a small proportion of the cases there was an "increased vascularity of the meninges." Dr. Murchison wrote: "The increased vascularity of the cerebral membranes in typhus must not be regarded as a sign of inflammation, and does not account for the cerebral symptoms observed during life. The vascularity is not greater, or more common, than when death results from disease of the lungs; and in most cases where it is increased, some impediment will be found in the pulmonary circulation, or there has been evidence of greatly impaired cardiac action. . . . I have repeatedly known the most severe cerebral symptoms during life, without abnormal vascularity of the cerebral membranes after death." This indicates, with tolerable conclusiveness, that the nervous symptoms in typhus are not the result of inflammatory changes in the brain or its membranes. On the contrary, they are due to mal-nutrition. It is evident that the poison-laden blood, which perverts the secretions, destroys the appetite and deranges all the digestive processes, and subsequently modifies the nutrition of the mucous membranes and skin, must be inadequate for the nourishment of the delicate and sensitive textures of the nervous system. Not only are they deprived of recuperative pabulum, but they are poisoned by the toxic constituents of the blood. If further proof of their mal-nutrition be required, it is found in the exaggerated knee-reflex and ankle-clonus, which can be elicited in the majority of cases of severe and prolonged fevers.

Treatment.—A thoroughly comprehensive knowledge of

the whole treatment of typhus fever is essential, if one would successfully grapple with its insomnia. Some points in general treatment must therefore be first referred to, as demanding careful study.

It must be directed to the conservation of strength, and to the prevention of complications, until the natural crisis of the disease is reached. It may be considered under three headings: The maintenance of the patient's strength; the promotion of the excretion of the poison; the alleviation of symptoms.

1. *The Maintenance of the Patient's Strength.*—This entails that the surroundings should be comfortable. It is important that the bed mattress should be firm, and at the same time yielding, and the bed clothes light and cool; the bedroom quiet, moderately lighted, and free from all external disturbances. It must be thoroughly ventilated and free from draughts, which occasionally cause bronchitis and like complications.

An efficient nurse is indispensable for typhus fever, and under no circumstances can she display her abilities more conspicuously. Thinking and acting, it may be absolutely for the patient himself, she notes all things—things that in themselves are the veriest trifles. His wants she not alone notes, but she anticipates them.

With regard to sleep she notices its absence, presence, and duration; if it is restless or disturbed by dreams or sleep-talking; or if there is delirium, she observes what its characteristics are.

Food.—While this is of the first importance independently, it is a far more frequent source of sleeplessness than is supposed. All overfeeding must be avoided. Milk, for example, should not, in the early days when thirst is still urgent, be given to assuage it. Food, in short, should be managed judiciously, and with direct reference to the digestive powers.

Stimulant.—It is seldom required by the young. Administered in limited quantity in severe cases, and in those occurring in patients beyond middle life, it promotes appetite, and improves digestion and assimilation, controls muttering delirium, and induces sleep. That it always influences delirium favorably is doubtful. It must be given prudently, and the quantity determined in each individual case; for in typhus as

in health, the effects of alcohol upon the system vary very remarkably. Its administration must be guided by the state of the pulse, heart, temperature, and tongue, as well as by the amount of sleep. It must be cautiously prescribed when the kidneys are not excreting well.

2. *Excretion of the Poison.*—The solution and elimination of the excessive quantity of urea is accomplished by diluents, the best of which is plain water without stint. Among others suitable may be mentioned, ice, soda or potash water, lemonade, barley, rice, or toast water; whey; lemon or orange juice and water; all of which may be iced if the patient prefer it. A sharp distinction must be drawn between diluent and food.

3. *Alleviation of Symptoms.*—Many symptoms may arise in the course of the disease which, of themselves, may cause sleeplessness. Their palliation is therefore highly desirable. For instance, an unusually high temperature may disturb sleep unduly. This calls for the administration of antipyretics, for although these are unable to shorten in the slightest degree the duration of the fever, they are occasionally capable of controlling in some measure the excessive metamorphosis, and in that way permitting of sleep. Many antipyretics possess decided hypnotic properties. Again, symptoms like cough may act in an equally perturbing manner, and these require suitable treatment for their relief.

Sleeplessness in the early days of typhus frequently depends upon, or is associated with, headache, and remedies which relieve the latter alleviate the former. It is not infrequently relieved by fomenting the head with water, as hot as it can be borne, as recommended by the late Dr. Graves of Dublin. Douching the head with warm water while the patient leans over the side of the bed suits well. In some cases more comfort is experienced from the use of tepid or cold applications, and in a few instances leeches to the temples are required.

If the headache does not yield and sleep return, chloral hydrate should be given in 20-grain doses, as recommended by Dr. Russell, of Glasgow, and repeated in three hours if required. Dr. Russell urged in its favor that the patient could be readily roused to clear his bronchial tubes, or to take food, and then fall asleep again. Sound sleep relieves headache; on the contrary, sleeplessness aggravates it.

Chloral hydrate is suitable in the early part of the disease when there is suffusion of the eyes and high arterial tension. When headache and sleeplessness are replaced by delirium and disturbed sleep, chloral hydrate is still the best hpynotic so long as the patient's strength remains good; but when the heart grows feeble, and perhaps irregular, its use is contra-indicated. Opium, or its alkaloid morphine, is then the better medicant. An injection of morphine with atropine about 8 or 9 P.M. suits well.

Dr. Graves was in the habit of giving tartar emetic with the opium when the delirium was unduly violent, and when the fever was unusually high, the amount being increased or decreased as these complications seemed to require. His ordinary prescription was as follows:

℞ Tinct. opii, ... ʒ i.
Antim. tart., ... gr. iv.
Mist. camphor., ... ℥ viij.

Sig. Take a tablespoonful every two hours until sleep is induced.

Dr. Murchison recommended digitalis in place of antimony as a vascular sedative, and as an aid to elimination through the kidneys instead of through the skin.

℞ Liq. opii sed., ... ʒ i.
Tinct. digital., ... ʒ i.
Spt. eth. nit., ... ʒ ij.
Aq. camph., ... ad ℥ vi.

M. Sig. Take two tablespoonfuls at once, and a tablespoonful every two hours until sleep is induced.

In delirium resembling that of delirium tremens Dr. Murchison advocated the addition of ♏ xx. of sulphuric ether to each dose of the digitalis mixture, or a pill containing half a grain of opium with three grains of camphor.

It is occasionally a very difficult task to decide whether or not to prescribe an opiate; from the knowledge, on the one hand, that the patient will die unless he get sleep, and on the other, that his suffused eyes and pin-hole pupils render it possible that fatal coma may follow the administration of the narcotic. In the majority of cases it is wisest to undertake

the risk. Dr. Murchison thought that opium was much more dreaded than it ought to be.

The use of opium is contra-indicated when there is vasomotor paralysis, extreme contraction of the pupils, bronchial or pulmonary affections, or any tendency to coma, or to suppression of urine. Belladonna, cannabis indica, and henbane have all been tried, and have found many warm advocates. Camphor, musk, sulphuric ether, and turpentine, are all useful remedies in weakened states.

In the insomnia of convalescence quinine and strychnine hold the first places. Careful diet, and the judicious use of malt liquors and change of air, are powerful adjuncts to treatment. Opium should be avoided, tending as it does to derange the secretions.

Enteric Fever.—This fever comes on insidiously and the patient may not be compelled to take to bed until six or eight days have elapsed. Its incursion is evidenced by chilliness and shivering, muscular and articular pain, malaise, headache, depression, and sleeplessness.

Toward the end of the first week the headache subsides, and the sleeplessness is associated with restlessness and mild delirium, or with hallucinations or violent delirium. If the patient does sleep he is disturbed by dreams. Still later, there may be somnolence, the sufferer lying for days without taking any notice of his surroundings or asking for food, and often neglecting even the calls of nature.

The chief features of the disease are, a somewhat quickened pulse, at first of increased tension but subsequently soft and compressible, and as the heart gets weakened, dicrotic; an increased temperature; scanty urine containing a large excess of urea; diarrhœa of a characteristic kind.

In enteric fever there is even less vascularity of the brain and membranes found after death than in typhus. Dr. Murchison summed up thus: "It was clearly shown by Louis and Chomel that the morbid appearances found in the brain and its membranes in enteric fever were equally common after death from other acute diseases, especially pneumonia, and that no relation existed between them and the intensity of the cerebral symptoms." Here again we must attribute the sleeplessness and other nervous symptoms to mal-nutrition of the nervous textures.

Treatment.—The remarks made upon the maintenance of the general strength and the excretion of the poison in connection with typhus fever, apply with equal force here. It may, however, be emphasised that the food must be free from solid particles of all kinds, and that all indiscretions in diet are apt to cause sleeplessness. The mitigation of all unfavorable symptoms is usually conducive to sleep. Diarrhœa, distention of the bowels with gas, cough, and other symptoms must be treated, and abnormally high temperature controlled.

For many years the writer has treated all his cases, with a few exceptions, from the start to the termination, with the following pills.

℞	Pulv. digital., ...	gr. ss.
	Sulph. quinin., ...	gr. ij.
	Ext. opii, ...	gr. ¼.
	Pulv. ipecac., ...	gr. ¼.

Ft. pil. i. Sig. One every four hours.

He increases or decreases the dose of the opium and digitalis, the former in reference to diarrhœa and sleep, and the latter to the state of the pulse and heart. He has had little trouble with sleeplessness. When the temperature rose to an abnormal height decisive measures were adopted for its control.

Sleeplessness should be treated upon the same lines as that of typhus. The writer has seldom required to resort to the use of special remedies, alcohol being usually sufficient to induce sleep. When a hypnotic is needed, he gives chloral in the early stages and opium in the later, combining potassium bromide with the former and antimony with the latter if the delirium be violent. He is satisfied that the injurious effects which are supposed to attend the administration of opium in this disease are over-rated; although when great prostration of the heart is present both opium and chloral are best avoided, and camphor and sulphuric ether used instead. He has got good results from the use of paraldehyde in 45-minim and urethane in 25-grain doses. In some instances, where death seemed to be imminent, sulphuric ether, subcutaneously injected, induced sleep and saved life.

It does not seem needful to pursue this subject further, as

the sleeplessness which accompanies influenza and relapsing fever, puerperal septicæmia and erysipelas, etc., requires to be treated upon the same principles.

Measles.—This is a febrile disease ushered in somewhat gradually with rigors, frontal headache, malaise, vomiting, and severe catarrh of the eyes and nostrils, with intolerance of light. In children convulsions may announce the invasion. Sleeplessness is present from the first, and may be accompanied by mild delirium. The fever quickly rises till it reaches 103° or perhaps 104° Fahr., very rarely higher; a high temperature indicating a severe attack, or the occurrence of complications. It usually subsides somewhat suddenly. The pulse is quick; in children, very rapid. The complications met with are chiefly bronchitis, pneumonia, pleurisy, pericarditis, diarrhœa, and ophthalmia.

Treatment.—Attention must be paid to the patient's surroundings and feeding, and to the alleviation of symptoms, etc. Sleeplessness, headache, and increased body-temperature are best treated by warm or tepid water douching to the head, and by the blanket bath, which is simply a pack in which a blanket wrung out of hot water is substituted for a cold wet sheet. A warm bath at night and a tepid one in the morning conduce to sleep, and to the comfort of the patient. A mixture of aconite, ipecacuanha, and Mindererus' spirit, mitigates the catarrhal symptoms, and moderates the temperature. Should a hypnotic be required, chloral hydrate may be given in doses of one grain for each year of age up till ten or twelve years. Opium is best avoided.

The sleeplessness of rötheln and of varicella may be similarly managed.

Scarlet Fever.—A few words will suffice, in addition to what has already been written, to indicate the treatment of sleeplessness in connection with scarlet fever; the shortest of the exanthemata, as it is the most variable. It is characterized mainly by high temperature (104° or 105° Fahr.) and an excessively rapid pulse, with redness, soreness, and occasionally ulceration of the throat. The temperature usually subsides gradually.

The complications which mostly disturb sleep are, vomiting, which is best treated with an emetic, and afterward with hydrocyanic acid in an effervescing saline; coryza, which

yields to the injection of a weak solution of nitrate of silver (gr. iv. to ℥ i.) into the nasal cavities; soreness and ulceration of the throat, which must be actively attended to, as also the earliest symptoms of inflammation of the middle ear. Ice applied externally and frequently swallowed is a useful remedy in those circumstances.

Salivation is sometimes a troublesome symptom, and the greatest care must be taken to remove the tenacious secretion as often as possible. No hypnotic is admissible under such conditions.

Treatment.—Headache yields to douching with either warm or tepid water; rheumatic pains require opium, and the best form is Dover's powder, but it must be carefully prescribed in the case of children. The temperature must be controlled, this being often accomplished by means of the wet pack repeated twice a day, which also conduces to sleep. When restlessness is pronounced, tincture of aconite may be given at hourly intervals, in minute doses, its effects being closely watched. Quinine is likewise serviceable in doses of one grain for each year of age up till ten years, and may be given either alone or with a small dose of digitalis. Antipyrine answers well in similar doses given every three or four hours. The writer thinks that antipyrine answers better in the course of the disease than at its onset.

Restlessness during the night, when the skin is hot and pungent, may be alleviated by the free inunction of cocoa-nut oil. Sleeplessness is likewise modified by anointing the head freely with oil, and this should be tried whenever the hair is not too abundant. These remedies will usually serve to promote sleep, but when they fail chloral hydrate must be cautiously given. Alcoholic stimulant and carbonate of ammonia are sometimes useful in advanced stages.

In very enfeebled states, both in scarlet fever and in diphtheria, the patient may lapse into a drowsy condition. When this occurs he should be roused frequently to take nourishment.

In the sleeplessness of diphtheria chloral hydrate and opium must be dispensed with.

In small-pox insomnia is frequently a persistent symptom; chloral hydrate and opium are then called for. Salivation requires careful watching. The free inunction of oil, impreg-

nated with camphor or carbolic acid, is always soothing to the skin, and sometimes induces sleep.

Acute Rheumatism.—Whatever may be the real pathology of acute rheumatism, it resembles the continued fevers in many important respects. After a premonitory stage, in which sleeplessness is a characteristic symptom, it is ushered in by chill, followed by rise of temperature, quickened pulse, and the usual symptoms of fever. Its main features are profuse sweats, not critical, having the odor of sour milk; pain in the joints, greatly aggravated by movement and pressure, and accompanied by swelling. It may affect most of the joints simultaneously or in succession, often progressing by metastasis, and frequently attacking the fibrous textures of the cardiac valves or endocardial or pericardial membranes. It impresses the nervous system, causing restlessness and sleeplessness throughout all its stages, and occasionally in convalescence. Sometimes slight delirium is observed, and also hyperpyrexia.

There are many complications, such as embolism of the brain, spleen, lungs, and kidneys, as well as pneumonia, pleurisy, etc.

Treatment.—This must be conducted upon the general principles laid down in discussing that of typhus fever. The diet, however, must be, as far as possible, free from meat soups. Alkaline effervescing water should be drunk copiously. The patient should be clothed in a flannel night-dress, and lie between blankets. Purgatives must be avoided as much as possible, as movements aggravate the distress. The salicylates are curative beyond the relief they give to pain, and they promote sleep out of proportion to the reduction of temperature that they effect. Salicin or the salicylate of soda in 20-grain doses should be given every afternoon at hourly intervals, for four or six times. The joints must be wrapped up in cotton wool, and supported so as to be maintained at rest. Anodynes, such as menthol liniment, chloroform and belladonna liniments in equal parts, or alkaline lotions (*e.g.*, ℞ Iodid. potass., ʒ ij., Bicarb. sodii, ʒ vi., Liq. morph. acet., ℥ i., Aq., ad ℥ xij.), are useful; or fomentations with a saturated solution of washing soda.

Antipyrine affords excellent results, relieving pain, lowering temperature, inducing sleep, and apparently curing the

disease. When hyperpyrexia occurs it must be treated actively by baths rapidly cooled.

If sleeplessness persist either as an individual symptom or as the result of pain, opium must be resorted to in the form of Dover's powder, or the subcutaneous injection of morphine, at bedtime. In convalescence, before the cerebral cells have recovered their tone, sleeplessness is best combated by quinine in 10-grain doses at bedtime, followed by whiskey or brandy in hot water. Warburg's tincture in ℥ ss. doses serves the same purpose. Endocarditis and pericarditis occurring in the course of this disease require the same treatment as the disease itself.

In sleeplessness which occasionally attends chronic rheumatism ten minims of the oil of wintergreen three times a day, the last dose at bedtime, is sometimes very efficacious. The use of sulphur in such cases should not be forgotten.

Rickets.—It is a common occurrence to be consulted about a child who is said to be restless and sleepless at night, and who spends a considerable portion of every twenty-four hours in crying, deriving no solace from its nurse's efforts to soothe and amuse it, and this when it is believed to be in good health.

Such symptoms very often depend upon rickets, although they by no means enter into the history of every example of the disease. On the contrary, many children who suffer severely from it present no such noisy symptoms, but sit quietly and peacefully throughout the whole day if they be left undisturbed. Inquiry discloses a history of slight fever, disordered evacuations, variable appetite, and loss of flesh; and that the child from being good-tempered and happy has become peevish and fretful, crying upon the least provocation or without it. Pushing the examination further, evidence of the disease is abundantly obtained.

During sleep three characteristic symptoms are noticed: that the child is restless and uneasy, and tosses off the bedclothes, preferring to lie naked even in cold weather; that it sweats profusely about the head, neck, and chest; and that its decubitus may be altered, the forehead being buried in the pillow, and the body supported on the elbows and knees. During sleep the veins of the head and neck are seen to be distended, while the carotid arteries throb and heave in a very marked way. Sleeplessness depends upon irritability of the

cerebral cells, and upon an enfeebled state of the nervous system from defective nourishment. This impaired nutrition is further evidenced in emaciation, late dentition, and backwardness in talking and walking.

The subjects of rickets are liable to suffer from night terrors, laryngismus stridulus, and spurious croup, and are apt to have their slumbers further disturbed by these causes.

Treatment.—The dwelling and surroundings are important. The drainage and ventilation of the house ought to be as perfect as possible. The day room should preferably have a southern aspect; the bedroom a temperature maintained at about 60° Fahr., and the mattress and pillow made of firm hair. Dr. West suggested that the latter should have a hole in the centre to relieve the occiput from pressure, which he stated greatly improved sleep. In many cases this is a comfort, as rickety children rub all the hair off the back of the head through rolling it uneasily from side to side. The clothes may be tied to the corners of the bed to prevent them being tossed off, as these children are very liable to catarrhal affections. A morning salt bath, cold or tepid, followed by gentle rubbing, a considerable portion of every day spent in the open air, and a change to the country or seaside, are all most desirable adjuncts to treatment. During the first six months of age the food should be restricted solely to milk, and if recourse be had to cows' milk, that of the Alderney is to be preferred. It should be boiled for a minute, and mixed with a fourth part of lime water. Between eight and fourteen months, oatmeal gruel or other farinaceous food may be added to the milk. After that time very weak meat soup, made of beef, mutton, or chicken, with a little cream, is allowable. Thin bread and butter sprinkled with brown sugar often agrees well. Raw meat pounded and eaten as a sandwich, gravy and potatoes, the yolk of a boiled egg, are all suitable. Digestion may be aided by malt extracts, which agree also when they are mixed with small quantities of cod-liver oil. Diarrhœa yields to the administration of the salicylates of bismuth or magnesia, in doses of from gr. ij. to v., after the tract has been cleared with rhubarb and soda. Tonics are usually required; steel wine, Parrish's syrup, small doses of quinine, strychnine with an acid, are all useful. The writer has got very good results from the syrup of lactophosphate of lime and iron.

Sleeplessness is generally remedied by sponging the patient's body at bedtime with warm vinegar and water, or with equal parts of olive oil and whiskey, and by a dose of quinine, varying from one to three grains. It is best given in milk. Opiates are extremely injurious.

It may not be out of place here to advert to a good rule in medical practice, to strip completely every child that cries without apparent cause, for the explanation will frequently be found in some obnoxious article torturing it.

Syphilis.—Inherited. This disease presents in the infant some symptoms analogous to those met with in rickets, *e.g.*, violent and persistent fits of crying by day, and restlessness and sleeplessness at night. It is to be similarly explained—the cerebral cells are starved.

If the child has been born free from the usual characteristic appearances of the disease, these will manifest themselves during the first six weeks. The chief are, congestion of the mucous membrane of the eyes and nasal cavities, causing well-marked coryza and snuffles, the latter interfering with the respiration. The appearance alters greatly. They become puny and aged-looking, with a muddy unhealthy complexion. A coppery rash appears on the hands, feet, genitals, perineum, and abdomen; ecthymatous eruptions are found here and there over the body; and mucous tubercles round the anus, and fissures at the angles of the mouth and nostrils. Loss of hair, hoarseness and huskiness of the voice, are noticed, and if the thymus gland be enlarged, there may be attacks of laryngismus stridulus. Further, there is loss of flesh; and when the teeth appear they are pegged.

Treatment.—This involves the treatment of the disease, no hypnotic being of any service. Equal parts of mercurial ointment and lanolin may be applied to the abdomen, and covered up with a flannel bandage, or small doses of gray powder given several times a day. Considerable relief is often afforded by local applications to the nostrils. The diet and regimen must be carefully attended to.

Syphilis.—Acquired. In the early history of secondary syphilis sleeplessness may depend upon the general febrile symptoms, and upon pain in different parts of the body. It is not to this form of insomnia that we wish to refer, as its association is perfectly evident.

There is a second class of cases associated with syphilis, which depend chiefly upon severe headache and obscure pains in the bones (particularly the clavicles), and also in the joints, resembling rheumatic pains, which tend to grow worse at night and to disappear during the day. Such cases will obviously be traced to their proper origin.

There is yet a third group of cases, which are much more obscure, and are characterized by insomnia, nightly recurring at a certain hour, when without pain or discomfort, or any apparent reason to account for it, the patient practically remains wide awake till the morning. The usual time for awaking is about two or three A.M. These cases present difficulties, for they are sometimes associated with dyspeptic derangements, and symptoms of anæmia and neurasthenia. The sleeplessness is never by any chance connected by the patient with the malady from which he has suffered, consequently he does not mention the circumstance at all; and as it sometimes happens in private practice that reasons exist for concealing the truth, the suggestion of syphilis by the practitioner may be repudiated.

This symptom may occur in either sex, and in any temperament, but it seems probable that it is more frequently met with in those of neurotic temperament, and particularly in the neurasthenics just mentioned. It is peculiar in this respect, that it yields only to constitutional treatment. There is no reason to doubt that sleeplessness is due to a cachectic condition, inducing an irritable and unstable state of the cerebral cells. Frequently the sole guide one has in these cases is the evidence to be obtained from old scars or lesions which tell their own tale. Some time ago the writer was consulted by a gentleman for loss of sleep, who presented the appearance of one who had long suffered from bad health, though he asserted it was not so. Upon looking at his tongue a small lump the size of a small hazel-nut was observed toward its centre, and no remark being made he was put upon specific remedies, when the tumor and the insomnia disappeared simultaneously. These patients have a cachectic appearance, with muddy and earthy complexions; symptoms which should always arouse the suspicion of the disease.

Treatment.—Mercury in one or other of its various forms is to be prescribed, such as a calomel vapor bath, the inunc-

tion of the oleate with lanolin into the groins or armpits, or the green iodide by the mouth. One of these combined with the free use of the iodide of potassium will speedily relieve the insomnia. As a rule, the iodide alone is not sufficient; mercury is the remedy. Tonics, such as iron and arsenic, and cod-liver oil, with increased nourishment, will probably be called for; while Turkish baths, wet packs, and change of air will expedite the cure.

Cachexiæ.—Insomnia due to this cause is closely allied to that depending upon syphilitic poison. The altered condition of blood leads to a perverted nutrition of the nervous centres, peculiarly favorable to insomnia. It is met with in those who have either suffered from well-marked malarious fevers, or in those who have lived in malarious districts without having had fever. It comes on at two or three in the morning with provoking punctuality, and persists until almost the hour for rising, leading to great mental and physical exhaustion. During the day patients complain of this exhaustion, and give evidence of it in increased irritability and depression; but if we except a hypersensitiveness to cold, they exhibit no symptom pointing to malaria, and certainly they do not attribute their sleeplessness to that cause. Some present a cachectic appearance, which affords a clue to the source. The writer has met with this form of insomnia more frequently in children than in adults. They have usually presented a pasty and unhealthy physiognomy.

Treatment.—This consists in the nightly administration of quinine, a grain for every year of age up to twenty years. Warburg's tincture in ℥ss. doses for adults is also efficacious. During the day arsenic should be given after meals. Massage, change of air to the seaside, and nourishing and stimulating diet, are all beneficial auxiliaries. Opiates are very unsuitable.

CHAPTER XV.

INSOMNIA DEPENDING UPON AFFECTIONS OF THE URINARY SYSTEM.

MANY diseases of the urinary organs give rise to disturbed sleep, and the want of sleep frequently becomes a troublesome and aggravating symptom. We cannot attempt in this work to discuss these diseases or their therapeutics. A few words must suffice to indicate the importance of the subject.

Sleeplessness in these ailments is mainly due to irritability of the bladder, which arises from many and diverse causes.

The irritability may depend upon an increased secretion of urine at night as well as during the day. Such a flow should always excite suspicion, particularly if no considerable amount of liquid is imbibed before going to bed. For it must be remembered that the quantity of urine secreted during sleep is greatly diminished, and there is therefore so much the less occasion to expel the amount which has accumulated.

Irritability of the bladder, dependent upon an abundant increase in the quantity of urine secreted, is met with in the following diseases.

Diabetes Mellitus.—Sleep is apt to be broken by frequent calls to urinate, and to appease hunger and assuage thirst. It is also disturbed by eczematous and pruriginous eruptions dependent on the sugar in the blood. These irritations, like all excitations of sensory nerves, are attended by a corresponding rise in the arterial tension, which disturbs sleep. Such patients are sometimes kept awake by pains in the extremities, neuralgic in character, which grow worse at night in bed. Dr. Pavy, who (with others) has called attention to these pains, believes they are due to peripheral neuritis. The writer has seen deep ulceration of the heel with excruciating pain occur in diabetes. Twice he has witnessed most agonizing pain in the shoulder prelude a fatal termination. In some respects the symptoms approximate to those of locomotor

ataxy, for there is often some awkwardness of gait, and the knee-jerk is usually lessened. Sciatica is frequently complained of. Affections of the skin, such as boils, carbuncles, erysipelas, etc., may perturb sleep.

Treatment.—Diet is of the first importance. Opium and codeine tend in the direction of curing the disease and producing sleep. Antipyrine and antifebrine have a decided influence over the pain which occurs in this affection.

Diabetes Insipidus.—In this affection sleep is chiefly disturbed by frequent calls to urinate.

Azoturia.—The writer has met with this ailment mostly in young men who were suffering from mental emotion. They complain of constant and teasing inclination to pass water, depending apparently upon a spasmodic irritability of the neck of the bladder. This is usually accompanied by a train of dyspeptic symptoms, and a marked feeling of prostration and inability for exertion. Their days are filled with mental weariness, and their nights with restlessness. The urine is generally copious (80 to 100 ounces), having a specific gravity ranging from 1.030 to 1.040, due to an excessive excretion of urea, and being quite free from sugar.

Treatment.—This consists in removal of the source of worry when that is possible, together with change of air and scene; nutritious diet, chiefly composed of non-nitrogenous foods, and the alleviation of dyspeptic derangements. Quinine and strychnine are the drugs that have afforded the best results. Minim doses of tincture of cantharides have on one or two occasions relieved the feelings of strangury.

Chronic Diseases of the Kidney.—In the later stages of these diseases there is irritability of the bladder, which invariably grows worse at night, and is associated with restlessness. The attendant symptoms naturally lead to the correct diagnosis and treatment of these affections.

Irritability may depend upon inflammatory changes in the prostate gland, bladder, and ureters, as well as upon organic diseases in these parts.

Acute Prostatitis.—This is mostly met with in young subjects, particularly of gouty habit, as the result of gonorrhœal and other inflammations. Among the symptoms, the urgent and constant desire to pass water is probably the most distressing. Relief is not obtained by emptying the bladder, and

a trace of blood not infrequently follows urination. Digital examination is sometimes necessary to clear up the diagnosis.

Treatment.—This must be conducted on antiphlogistic principles. Opium or cannabis indica are required to alleviate the pain.

Chronic Prostatitis.—In this the symptoms are of the same description, but modified in degree. They are always aggravated during the night.

Treatment.—Here counter-irritation has a large field of usefulness.

Chronic Hypertrophy of the Prostate.—This is one of the troubles of advancing years. Many such patients spend their days and nights in constantly relieving the bladder; sleep is consequently much curtailed. The act of micturition is usually both preceded and accompanied by pain. Eventually a catarrhal condition of the bladder ensues, the urine becoming ammoniacal, and copiously mixed with glutinous ropy mucus and pus.

Treatment.—These cases demand great care, as they are apt to be made worse by all exacerbations, such as slight congestions initiate. Every effort must be made to prevent these untoward occurrences by avoiding chills, etc. Dietetic errors are to be guarded against. Fluids should be sparingly taken in the latter part of the day. Tonics are sometimes useful. Pulque appears to act beneficially upon catarrhal affections of the mucous membrane of the urinary tract. The occasional passing of a soft catheter is often advantageous. Opiates are sometimes absolutely required; they are best used in the form of a suppository. As they are not curative, they must be employed judiciously. It is in this class of case that the morphine-habit is most likely to be formed. Belladonna must not be used, as it tends to impair still further the expelling power of the bladder. The subcutaneous injection of ergotin has done good service; but the constant electrical current seems to promise still better results.

Acute Cystitis.—This may arise from chills, from retention of urine, from various lesions connected with the nervous system, from calculus, from septic contamination, etc. It invariably gives rise to much distress. The collection in the bladder of a few drops of urine leads to exquisite pain, and to an uncontrollable desire to expel the accumulated contents.

It is usually associated with well-marked constitutional disturbance.

Treatment.—This must be in most cases decidedly antiphlogistic, in which opiates and diluents hold a prominent place. A suppository of morphine and belladonna at bedtime is a useful means of procuring sleep. The tincture of collinsonia canadensis, in doses of ʒ ss. to ʒ ij., appears to act beneficially. Aconite and belladonna are also useful.

Chronic Cystitis.—This depends upon the same causes as the acute variety. It may also be caused by gonorrhœa, stricture of the urethra, etc. The symptoms resemble in some degree those of an enlarged prostate.

Treatment.—This is very unsatisfactory in many cases. The medicines mostly employed are tonics, buchu, triticum repens, hydrastis, uva ursi, copaiba, and sandal-wood oil. Saccharine has been recommended of late years. Washing the bladder once or twice daily with weak solutions of quinine, resorcin, boracic acid, cocaine, carbolic acid, etc., is the most reliable remedy. Opiates at night are sometimes unavoidable; they are best given *per anum.* In females, dilatation of the urethra is occasionally useful.

Pyelitis.—This disease may result from many causes, often from inflammatory mischief spreading up the ureters, but it more commonly arises from calculus in the kidney. It is accompanied by much more marked constitutional disturbance, fever, loss of flesh and strength, progressive anæmia, night sweats, etc.

Treatment.—This is even more unsatisfactory than that of chronic cystitis. Tonics, hydrastis, eucalpytus, yellow santal oil, pulque, collinsonia canadensis, and opiates, with nutritious diet, are probably the best remedies. In this as well as in the other similar diseases just considered, the exciting cause must always be the guide to the remedy selected. When calculus is the cause, the nature of the stone must be accurately ascertained.

Irritability is invariably caused by vesical and renal calculi, which may also induce secondarily cystitis and pyelitis.

Vesical Calculus.—This always disturbs sleep from the pain it causes. In children sleeplessness and dreams are frequently the only symptoms of stone in the bladder. Irritability may be absent. The treatment of vesical calculus is

obviously surgical. Palliative relief can be obtained only from opium.

Renal calculus very frequently gives intimation of its presence during the night. That appears to be the favorite time.

Treatment.—Morphine is urgently called for during the attack of pain. General treatment must be varied with the nature of the stone.

Irritability of the bladder may be set up reflexly by hemorrhoids, fissure of anus, worms, displacements of the womb, and in rarer instances by a floating kidney. It can only be relieved by remedial measures directed to these conditions.

Sleep may be disturbed by attacks of chordee, and by a distended bladder, which sometimes causes restlessness and dreams, without incontinence following. In children this source of sleeplessness should never be overlooked. A long prepuce requires surgical treatment. In all such cases the child should be wakened three or four hours after going to bed to empty the bladder.

Sleep disturbance in children is occasionally due to an excessive excretion of uric acid. In many, this has no clinical significance. Limiting the quantity of nitrogenous food, and the administration of alkalies, are always followed by improved sleep.

Incontinence of Urine.—This disorder depends upon a paroxysmal neurosis, and is closely allied to sleep-walking. It consists in passing water during sleep, involuntarily and unconsciously.

Beginning in some instances in the early years of youth, it usually ceases at puberty, although in a few cases it is continued into adult life. In the latter group it is important to discriminate between this variety of incontinence and that which occurs in connection with epileptic seizures during sleep. It is most commonly met with in those who have neurotic tendencies, and a hereditary predisposition to it. Like chorea, epilepsy, and other allied disorders, it may be excited by fright, fear, or other impressions acting strongly upon the emotional centres; but it may be originated by reflex irritations, such as are caused by a long and tight prepuce, increased acidity or alkalinity of the urine, constipation, worms, or fissure of the anus. The bad habit instigated by these exciting

causes may be perpetuated for years; their removal not being immediately followed by immunity from it. The centres which control micturition being unstable, they respond to preternaturally slight impressions; and their stability requires to be achieved ere the bad habit is checked.

The affection is always troublesome, and the feeling of degradation it excites in the minds of those who suffer from it is extremely annoying. Ashamed of their infirmity, they are apt to become shy and morose; this is particularly the case in young women. Males and females are equally liable to it. Boys have been known to manfully suffer the pain of the prepuce sloughing off, brought about by themselves tying a cord round it, in the hope of controlling the disagreeable symptom. It occasionally gives rise to serious consequences. Nearly twenty years ago the writer amputated at the upper third of the thigh the limb of a young female, which had been shattered in a railway accident. She was a woman of weak intellect. The following morning he found the dressings saturated with urine, and he was then told that the patient suffered from incontinence. No medication nor mechanical device rendered any effectual service; whenever she slept she spasmodically expelled her urine. The flaps sloughed, and she died of septic poisoning.

It may occur once or even twice during the same night, generally soon after going to bed or early in the morning; often at the same hour or hours, and always when sleep is deepest. Trousseau, who studied this subject most carefully, pointed out that these sufferers are usually deep sleepers, and that they may rise in the early part of the night to empty the bladder, yet later on, when sleep is most sound, they pass water involuntarily. It does not depend upon the quantity of water in the bladder, for if the quantity were large it would awake the sleeper; nor upon the quantity of fluid imbibed: it is a neurosis. Like other centres, those of micturition are affected by mental influences. This is demonstrated by the urgent desire to pass water induced by fright; as also by the ability we possess of inhibiting, in our waking moments, the calls to micturate, or, in other words, of inhibiting the centres which dominate the detrusor urinæ. When we are awake and in good health the detrusor urinæ and sphincter muscles are equally balanced; in this affection the former acts spas-

modically during sleep, and expels the urine forcibly. Where the sphincter is weak it is more easily overcome, but in these cases there are usually some signs of weakness displayed during the day.

The complaint may cease during an illness if sleep be interfered with, and reappear as health and sleep are re-established. Although the urine is passed unconsciously, in many instances the act immediately awakes the patient; it is thus a disease of sleep and a disturber of sleep.

Treatment.—All causes capable of setting up reflex irritation must be removed; the bowels unloaded and regulated; worms expelled; fissures cured; a tight prepuce stretched or incised, and if adherent, removed; a contracted meatus dilated; and abnormal conditions of the urine rectified.

In the enfeebled and anæmic, in whom the sphincter is apt to be weak, general and local faradization is sometimes, if not always, useful. The food must be carefully selected. A cold spinal douche given every day, lasting two or three seconds, followed by gentle friction with a warm towel, with change of air, preferably to the country, are useful aids.

Tonics combined with small doses of cantharides are often serviceable.

For a child of six years:

℞ Tinct. canthar., ... , . ♏ x.
Vin. ferri, ... ℥ iv.
M. Sig. A dessertspoonful thrice daily in water.

For a youth of fifteen years:

℞ Syr. phosph., ferri, quin. et strychn., . . ℥ ij.
Syr. phosph. ferri co., ... ℥ ij.
Tinct. canthar., ... ʒ ss.
M. Sig. A teaspoonful in water after meals thrice daily.

In the cases in which the general health is obviously not depressed, careful attention must be paid to the points just referred to, for everything should be done to raise the tone of the nervous system. The hour at which the water is usually passed should be noted, and if it is possible sleep should be interrupted shortly before—not to pass water unless the desire to do so be present, but to cause the sleep to be less deep. Belladonna is the foremost remedy for this affection, and it

acts in a remarkable way in reducing the irritability of the centres of micturition. It also acts by lessening the excitability and conductivity of the sensory and motor nerves. This is not infrequently seen in adults, who are so susceptible to its influence in some cases that $\frac{1}{4}$ or $\frac{1}{3}$ of a grain of the extract, in a laxative pill, is sufficient to cause retention of urine. Children, however, are very tolerant of the drug, in most instances bearing much larger doses than adults. It is well to begin with a dose ranging from five to ten minims of the tincture three times a day, and gradually to increase the dose until its physiological effects are produced, for until that point is reached the therapeutic benefits are seldom obtained. Should belladonna fail, chloral hydrate will be found a reliable remedy.

CHAPTER XVI.

INSOMNIA PECULIAR TO FEMALES.

SLEEPLESSNESS or disturbed sleep is apt to appear in females from causes peculiar to the sex, notably at the epochs of puberty and the menopause, at the catamenial periods, during pregnancy, and after parturition. It chiefly affects those of the neurotic temperament, with highly-strung and unduly-sensitive nervous systems, and those debilitated by neurasthenic conditions.

Puberty.—At this time the body and mind participate in rapid evolution, the physique is changed, and new instincts and desires arise; the whole creature emerges into womanhood. In the course of transition the equilibrium of the nervous and vascular systems is liable to be perturbed. This occasions such young females to exhibit emotional tendencies, to suffer from malaise, headache, and palpitation, and sometimes to become affected with chorea and epilepsy.

Disturbed sleep at this time is by no means rare, and once initiated it is apt to recur at the catamenial periods, when evidence of increased nervous excitability and fatigue is seldom wanting. Insomnia is a most undesirable symptom at such a juncture, for a plentiful amount of sleep is urgently required for the development and recuperation of the nervous system.

Treatment.—This consists in adopting measures calculated to restore the stability of the nervous system, such as regulating the diet and regimen of the patient. Occasionally, rest in bed for two or three weeks answers admirably, by recruiting the general tone of the body. Galvanization in some instances suits excellently. The bromides may be given in full doses at bedtime. It is best to avoid morphine and other powerful narcotics.

Menstruation.—Insomnia occurring at the menstrual periods depends upon like causes, the process, though a natural one, perturbing the system. The perturbation is a gen-

eral, as well as a local, one. The body-temperature is modified, and the nervous and circulatory systems are disturbed. The implication of the nervous system is readily recognized; sudden mental emotion can arrest the flow. On the other hand, the recurring periods give rise, in many, to sick-headache, variations in temper, and restlessness during the day, and to dreams and sleep disturbance at night. Its effects can also be well studied in this class of patients, when they are also the subjects of slight visual defects. They complain of errors of refraction at these recurring times, being powerless to overcome them by accommodation as they are able to do in the intervals. They can be equally well observed in a large number of females whose digestive powers are limited—whose organs are able to cope with the daily work in the intervals, but which are quite inadequate at these periods. The excretions also are all more or less interfered with. Hence it is that dyspeptic troubles arise at these times, and so frequently become a source of sleep disturbance. The derangement of the equilibrium of the vascular system leads, occasionally, to alterations in the quantity of blood in the thyroid gland. As that gland exercises an important influence, both over the cerebral circulation and on sleep, modification of its functions may account, to some extent, for the sleep troubles. It is undoubted that sleep derangement is more common in young women than in young men. They are more susceptible to the influence of toxic agents, notably of lead. This can only be explained by the vulnerability of their constitutions which the menstrual functions inaugurate. It is more marked in some families than in others, just as some families have a greater proclivity to sleeplessness.

Treatment.—This must be conducted upon the foregoing principles, but the following pill may be given for a few nights.

℞	Ext. stramon., ...	gr. ¼.
	Pulv. camphor., ...	gr. ij.
	Ext. hyoscy., ...	gr. iij.

Ft. pil. i. Sig. Take one at bedtime.

Tonics sometimes do good.

Dysmenorrhœa, menorrhagia, and *over-lactation* cause insomnia. It is usually due, in the latter cases, to cerebral anæmia. The symptoms which these patients complain of are

all indicative of mal-nutrition of the nervous centres; their sight is dim, and it is greatly affected by all sudden alterations of posture. Hearing is dulled, and noises in the ears are seldom absent, while the general sense of touch is usually impaired. The general symptoms are those of anæmia.

Treatment.—Such cases of insomnia require that the bodily drain be checked, and that the tone of the nervous and vascular systems be invigorated by suitable remedies, such as were indicated in discussing the subject of cerebral anæmia.

Displacements of the womb, with which frequent micturition is often associated, and some diseases of the ovaries, give rise reflexly to insomnia, a symptom which can only be relieved by the rectification and alleviation of the disturbing causes.

Amenorrhœa with chlorosis has insomnia as a symptom. A few words must be said regarding it. It depends upon the depravity of the blood peculiar to the latter, which not only interferes with the nutrition of the nervous system, but brings about modifications of vascular tension, and invariably leads to defective digestion, often characterized by painful symptoms, as gastralgia. These combine to disturb sleep. The late Dr. Graves pointed out a very curious fact concerning this form of insomnia. He wrote: "It is singular how long sleeplessness often continues in chlorosis without inducing those serious consequences that are produced by this symptom in other morbid states of the system." The writer has no explanation to offer of this fact; he can only confirm the accuracy of the observation. His friend, Dr. Mackintosh, has suggested that it may be due to the small amount of tear and wear of the tissues in chlorosis, requiring less recuperative action.

Treatment.—This consists in remedying the state of the blood and re-establishing the menstrual flow, which is best accomplished by means of warm laxatives and ferruginous tonics. The old combination of Griffith's mixture and the compound decoction of aloes, is an admirable one. Blaud's pills, in doses of from one to four, taken after meals thrice daily, with an efficient dose of infusion of senna pods at bedtime, also answers well. Arsenic is occasionally valuable. This medication may be varied at the recurring periods by the administration of the precipitated oxide of manganese, or

the permanganate of potassium, to promote the menstrual flow.

Menopause.—At the menopause, as at puberty, sleep is apt to be disturbed. Cases of unusually prolonged sleep occurring in this connection have frequently been recorded, but the more common disturbance is that of want of sleep. It will be seen from the tables (page 550) that the menopause caused 18 out of 273 consecutive cases of insomnia. The changes at this important epoch are vast and momentous; the whole reproductive apparatus is functionally metamorphosed from a state of nervous and vascular activity into one of repose. As this does not take place in the various parts involved in the generative functions simultaneously, disorders are apt to supervene. For instance, the ovaries during this important period are preternaturally irritable and excitable. In the course of the months or years that this decadence is progressing, besides a liability to floodings, which are productive equally of anæmia and sleeplessness, a train of nervous symptoms are apt to ensue, such as occipital headache, giddiness, depression of spirits, hypochondriasis, hysteria, irritability of temper, flushings, chills, perspirations, etc. The perspirations frequently come on at 4 or 5 A.M. and cause awaking, and they are often associated with palpitation. In some cases there is perversion of the moral sense, and even insanity. Lithiasis very often manifests itself at this time, and gives rise to increased arterial tension and palpitation of the heart.

Dr. Saundby, of Birmingham, and others, have described a form of tingling and numbness ("pins and needles") which is apt to come on in the limbs during sleep and to interrupt it. Dr. Ormerod thought it most common at the menopause. The writer has met with several cases at that epoch, in which the upper and lower limbs were variously affected. Its onset certainly terminates sleep. In most of the cases it appeared to depend on the gouty taint; it quickly disappeared on antigouty treatment.

Sleeplessness and sleep disturbed by dreams are usually the most constant symptoms of all. Probably unmarried women suffer more from these disagreeable symptoms than their married sisters.

These cases are mainly divisible into two classes, the plethoric and anæmic.

Treatment.—The plethoric, in whom blood-pressure is markedly increased, and those in whom headache is a prominent symptom, may be relieved by bleedings from the temples, repeated at the periods when the catamenial flow shall have appeared, and also by mercurials and alkalies.

℞ Subchlor. hydrarg., ... gr. i.
Ext. hyoscy., ... gr. iij.
Ft. pil. i. Sig. Take one every tenth night.

℞ Tinct. aconit. (B. P.), ... ♏ xxiv.
Iodid. potass., ... ʒ i.
Bicarb. potass., ... ʒ iij.
Aq. menth. pip., ... ad ℥ vi.
M. Sig. Take a tablespoonful in water before meals thrice daily.

The nitrites are efficient remedies.

Turkish baths carefully managed are useful adjuncts to treatment. The inhalation of amyl nitrite (♏ iij.) at bedtime, or during the night if sleep be interrupted, occasionally acts as a hypnotic. This can be conveniently prescribed in capsules. The bromides may be given for limited periods, as during the week when the loss should naturally recur. The dose most suitable is ʒ ss. at 6 and again at 10 P.M. A residence at Kissingen or Bath is beneficial.

In the anæmic cases arsenic and iron are the remedies called for. The syrup of bromide of iron, or of bromide of iron with quinine and strychnine, in ʒ i. doses thrice daily after meals, answers well. These should be taken through a tube, as they are apt to discolor the teeth. The feeding should be generous, but stimulants must be prescribed cautiously, if at all. Some of these patients improve at Schwalbach and Homburg, others in Switzerland. The bromides must not be given for any length of time, as they increase the anæmia. Chloral hydrate and morphine, like alcohol, are dangerous remedies on account of the especial tendency at this epoch to the formation of injurious habits. In a case recently under treatment sulphonal failed to induce sleep satisfactorily, although it was pushed to the extent of causing very pronounced drowsiness, and some inco-ordination of movement in the daytime. Belladonna with cannabis indica and camphor eventu-

ally produced sleep. Paraldehyde and urethane are generally reliable and suitable drugs.

Pregnancy.—Although pregnancy is a natural process, it inaugurates conditions so novel as in many cases to disturb the equilibrium of the nervous and vascular systems. This is evidenced by a train of symptoms chiefly referrible to these systems, and mainly seen in women who are neurotic, delicate, and sensitive, and pregnant for the first time, although the multiparous are not exempt. These symptoms differ widely in character, and are the source of much discomfort and suffering. Such patients become emotional and mentally perturbed, depressed and introspective, brooding over trifles, and having a groundless dread of impending evil. They suffer from neuralgic pains and cramps, from morning sickness, acidity, flatulence, and constipation; also from palpitation, and, as Dr. Broadbent pointed out, from increased vascular tension, which may be due to the cardiac hypertrophy invariably present, and perhaps in a less degree to the rapid tissue-change going on in the body. The combined vascular modifications are so considerable as to lead, in the majority of pregnant women, to the production of functional cardiac murmurs. These symptoms, united with others of less import, bring about hyperæmia of the brain and consequent cerebral activity, which is attended by sleeplessness. Cramps in the limbs not infrequently interfere with sleep. They are probably due to the rapid metamorphosis just referred to; sometimes they are caused by pressure on nerves.

Treatment.—This must be conducted upon general principles, the object being to build up the nervous system, to engender confidence and hope, and to calm the vascular system. The patient must be counselled to lead a regular life, to be much in the open air without fatigue, to observe early hours, and to have pleasant and peaceful society. All digestive derangements and disorders, such as pruritus, must be rectified. The bromides are useful, particularly bromide of lithium, either alone or in combination.

℞ Brom. lithii, ... gr. xv.
Tinct. lupul., ... ʒ ss.
Aq. chlorof., ... ad ℥ i.
M. ft. haust. Sig. Take at bedtime.

The monobromide of camphor in 4-grain doses is often helpful.

Parturition.—It occasionally happens that a hypersensitive woman, during a prolonged or severe labor, suffers so much from shock to the nervous system that she becomes irritable, restless, intolerant of all disturbing influences, and sleepless. The pulse, instead of falling in the usual marked way, continues to beat quickly, and that without any accompanying rise of temperature, indicating that the innervation of the heart is perturbed. The insomnia may be complete, and it may persist during several nights. It is always a symptom of grave import, for if unrelieved it may usher in puerperal insanity. It is, indeed, the most pronounced premonitory symptom of that malady. When the want of sleep lasts some days, fever and other constitutional symptoms appear, which intensify the distress. In another class of cases the patient does not sleep throughout the first night, but may feel unusually well, and gradually symptoms of disturbance ensue, which terminate in some toxicohæmic disorder. This loss of sleep, with a feeling of exaltation, not rarely prognosticates ill. Euphoria after parturition, and after operations, invariably portends mischief. Without any other symptom to justify it, it inspires the physician with dread. He knows its meaning only too well. The patient's manner is changed, she becomes unnaturally effusive, and apparently delights to reiterate the statement that she is so well she is quite able to get up. The writer has been accustomed to base his prognosis on sleep. If the patient has slept well and soundly she may go on nicely. If she has not she seldom escapes an illness.

Sleeplessness may depend upon more marked causes. For example, it frequently follows post-partum hemorrhage, and is then due to acute anæmia of the brain; it is also maintained by severe after-pains, pains which in moderation subserve a useful physiological purpose, but in excess lead to constitutional disturbance, which the loss of sleep greatly aggravates.

In no condition are the benign influence of sleep and the disastrous effects of insomnia so well exemplified.

Treatment.—That sleep may not be thwarted it is of the utmost importance that there should be a complete absence of sounds in the bedroom, which should be darkened and well ventilated. Hypnotics are of the greatest value, and they

must be pushed until sound sleep is induced. The monobromide of camphor, in 4-grain doses, is reliable; also the following:

℞ Liq. morph. acet., ... ℈ij.
Spt. chlorof., ... ʒ ij.
Tinct. digital., ... ℈ij.
Mist. camphor., ... ad ℥ iv.
M. Sig. Take one-fourth every hour until sleep is induced.

Morphine with atropine may be given subcutaneously. A small allowance of alcohol often acts beneficially.

After post-partum hemorrhage the remedy is the hypodermic injection of morphine, with small quantities of alcohol. During convalescence sleep is materially improved by the use of salines and digitalis.

For after-pains sedatives are required, but when they are neuralgic in character no remedy relieves them so speedily as acupuncture, with a fine needle, over the lower part of the sacrum and coccyx, as recommended by the late Dr. Sidey of Edinburgh.

For some months after a severe confinement the patient may continue somewhat sleepless and even hypochondriacal. This condition is best relieved by the treatment indicated as useful for hypochondriasis. It must, however, be mentioned that tincture of cimicifuga, a remedy highly praised, in other cases, by the late Sir J. Y. Simpson, sometimes affords excellent results.

CHAPTER XVII.

BATHS.—ELECTRICITY.

THE writer appends a very brief summary of some remedial measures he has found useful in the treatment of insomnia. These embrace the cold bath, sitz bath, spinal douche, spray or needle bath, cold foot bath, salt bath, wet pack, hot foot bath, hot bath, Turkish bath, and lamp bath; and also electricity.

BATHS.

Baths are so serviceable in the treatment of insomnia that a short reference must be made to their physiological effects.

The Cold Bath.—The morning plunge in cold water is an important, if usual, process, being an excellent tonic and derivative. The first effect of the bath is to cause contraction of the muscular fibres of the skin, producing the appearance called goose-skin, a process which has been styled cutaneous gymnastics. Coincidently, the blood-vessels of the periphery contract, while those of the brain dilate. The cardiac contractions and respirations are quickened, and the blood-pressure is raised. This is immediately followed by a concurrent dilatation of the peripheral and a contraction of the cerebral blood-vessels, slowing of the heart and respirations, and lowering of the blood-pressure. The reaction, as it is called, is much aided by cutaneous friction. When reaction is good it is accompanied by a feeling of lightness and elasticity of the body, and by a desire for active mental and physical exertion.

The Sitz Bath.—As regards the action of the sitz bath it is found that the cold water causes contraction of the blood-vessels of the cutaneous surface and of the superficial muscles, and reflexly those of the pelvis and abdomen, the cardiac contractions at the same time becoming less frequent, and the blood-pressure being raised. After the bath reaction sets in, and the blood-vessels dilate, attracting and retaining for a

time a large volume of blood, so that the cerebral vessels are partially depleted; and this, together with the marked tonic effect produced by the bath on the nervous system, renders intelligible the favorable results so often accruing in the treatment of insomnia by the sitz bath.

When a more pronounced effect is desired it can be accomplished in one of two ways: by a particular construction known as the "running sitz," in which an inlet and exit pipe, each of equal calibre, allow of a constant supply of cold water, and by having two sitz baths placed side by side, the one containing cold and the other hot water, so that the bather can move quickly from one to the other. This is probably one of the most efficacious derivatives we possess.

The sitz bath should be raised from the floor to such a height as will allow the bather to sit in it comfortably, and should contain from four to five inches of cold water, this being usually sufficient to cover the hips and lower part of the abdomen. During the process the body should be covered with a warm wrap, and the duration of the bath varied according to the strength of the bather and the effect desired, from five to thirty minutes being the usual limits. After the bath has been completed the skin should be dried with a warm towel, and then rubbed briskly with a flesh brush.

The Spinal Douche.—This is a column of cold water falling from a height with some force upon the back of the neck and down the spine. It is a most powerful stimulant to the medulla oblongata and the centres it contains, and is best taken standing with the feet in hot water. If, however, no special arrangement exists in the bath room, it can be improvised with a large can of water poured from a height while the patient sits in a sitz bath. In enfeebled states this powerful remedy must be cautiously used. The alternate spinal douche of hot and cold water is less severe, and is almost equally efficacious.

Spray or Needle Baths.—These are highly stimulating to the nervous system, imparting a sharp shock to it, which is speedily followed by reaction. They should be of short duration, the time being proportioned to the strength of the patient, who ought to stand, during the process, with his feet in hot water. When reaction is slow they may be used hot and cold alternately, or warm throughout, a cold wave being

allowed to flow upon the upper part of the spine for a few seconds to "finish."

The Cold Foot Bath is in certain cases an energetic derivative. The feet and ankles are placed in cold water for five or more minutes, then rubbed with a warm towel, warm stockings put on, and a short walk taken to induce a somewhat lasting hyperæmia of the feet.

The Salt Bath.—Sea-bathing is particularly invigorating, especially when the patient can swim. Within strict limits (the duration not to exceed the onset of reaction) the salt bath is one of the most powerful tonics we possess, acting upon the nervous and circulatory systems so as to raise the tone of the whole body. This is evidenced by a feeling of well-being and an inclination for exertion, by the appetite increasing, and digestion and assimilation becoming more speedy and complete. The motion of the waves against the body considerably augments the tonic effects of the salt bath.

Whatever cold bath be selected, it is best taken an hour before meals, and it should always be followed by brisk flesh-brushing and a short walk.

All cold baths are unsuitable at the menstrual periods.

The Wet Pack.—This is a derivative and calmative of the highest order, and is very advantageously used, in pronounced cases, in connection with either the cold sitz or the Turkish bath. Ringer, in his work on Therapeutics, quotes the following directions for managing the wet pack from Dr. Johnson's writings on Hydropathy, which are so good that they are here reproduced. "Upon the mattress, and extending over the pillow, two blankets are spread, and over this a sheet wrung out as dry as possible with cold water. The patient lies down on his back, perfectly unclothed, with his head comfortably placed on the pillow; an attendant now approaches, say on the patient's left, and first puckering the blanket from the back of the head down to the back of the neck, reaches across his chest, seizes the right upper corners of the blanket, and brings them tightly across under the chin to his own side (the left), and tucks them well and evenly under the left shoulder, where it joins the root of the neck, and under the point of the same shoulder. He now reaches across the body again, and brings over all the rest of the right sides of the blankets to the left side of the patient, and then proceeds to tuck them

well and evenly under the left side, beginning where he left off, at the point of the shoulder, and proceeding quite down to the heels. The patient is now entirely enveloped in one half of the blankets and the attendant finishes the operation by passing over to the right side of the patient, and then proceeding to tuck the left sides of the blanket under the right side precisely in the same manner as we have seen him tuck the right sides of the blanket under the left side of the patient. The attendant, standing on the right side of the patient's legs, finally insinuates his left hand under the backs of the ankles, lifts them up, and then with his right hand turns back the lower ends of the blanket under the heels. . . . The wet sheet should reach to the ankles, and . . . be wide enough to overlap in front of the body about eight or twelve inches; over the whole four or five blankets are placed, and pressed down close to the sides."

It is a great improvement to put a hot water bag to the feet before folding them up in the manner specified, and also to apply a cold water cloth to the forehead. The patient may drink cold water if he desires, and should remain in the pack for an hour, during which time he will probably fall asleep. At the end of the process he should sponge himself rapidly down with tepid water, and get into bed. Some patients object to this remedy on account of the trouble it involves, but if the details are methodically arranged beforehand the whole application is easily and speedily managed.

Hot Foot Bath.—This has long been recognized as a domestic hypnotic. It acts as a derivative to the brain by dilating the blood-vessels of the feet and limbs. This vascular relaxation may persist for several hours, during which time there is a corresponding anæmia of the brain.

The Hot Bath acts in a similar manner, though much more powerfully. It first increases the force and frequency of the action of the heart, and produces hyperæmia of the brain; but these conditions are speedily reversed, the heart beating with diminished strength, the blood-vessels of the body generally dilating, while the cerebral vessels become concurrently anæmic. If it is unduly prolonged these conditions tend to induce a sense of oppression and faintness. The utility of a hot bath at bedtime in promoting sleep is somewhat uncertain, suiting many patients admirably, but in

others causing a degree of excitement which is fatal to sleep.

The Turkish Bath, taken under medical advice, is an efficacious means of restoring sleep in certain forms of insomnia. This bath is derivative in all its stages—the copious perspiration causing rapid elimination through the skin, the shampooing and kneading exciting a quicker flow of blood and lymph through the whole body, while the subsequent cold or cool douching induces rapid oxidation.

It has, further, a derivative action, flushing the skin and superficial muscles with a large volume of blood, while the surcharged cerebral vessels are relieved to a corrseponding extent. As regards vascular tension, the commonly received opinion, with which the writer agrees, is that during the time spent by the bather in the hot chamber it is lowered; although it must be mentioned that Dr. W. J. Fleming, of Glasgow, in some interesting observations made upon himself, and recorded in the thirteenth volume of the "Journal of Anatomy and Physiology," states that "the principal effect upon the arterial tension seems to be an increase produced by the greater rapidity of the heart's action combined with the dilated, we might almost say gorged, condition of the capillary circulation."

The Turkish bath exactly suits the requirements of many cases of insomnia, relieving the cerebral congestion, acting as a tonic to the nervous and circulatory systems, aiding digestion, and increasing assimilation. Well and judiciously used, it is a great boon to the sedentary and wakeful brain-worker, and the cases in which it is contra-indicated are extremely rare. The full benefit, as a rule, is not derived until after six or seven baths have been taken; in fact, discomfort may be increased and wakefulness intensified after the first or second, especially if perspiration is not easy and free. Subsequently, a buoyant feeling of well-being is experienced, and the weight of the body shows a tendency to increase, the latter being a point of some importance. Decrease in body-weight, after a course of six or eight baths, ought to lead to the question of the advisability of their employment being reconsidered. It is important that these baths should not be resorted to without advice as to the extent to which they should be carried, and the frequency with which they ought to be taken. For it must not be forgotten that the effects of a prolonged stay

in an extremely hot room (200° Fahr.) are very marked. The pulse is much quickened, possibly to 120, the temperature is raised to 103° Fahr., and the number of respirations to twenty per minute. An equally useful bath may be obtained by spending the time in a much lower temperature, in which the respiration, temperature, and pulse rate are unaffected. It is likewise of some consequence that the bath be thoroughly ventilated and the air quite dry.

A few general directions as to the use of the Turkish bath may not be out of place. In London most of the public baths have four hot rooms, the temperature ranging from 110° to 240° Fahr. That in the first room averages 110°, in the second 140°, in the third 175°, and in the fourth 230° to 240°. Upon entering the first room the bather should have his head douched with tepid or cold water, so that it may be the first part of the body to perspire, thus lessening any tendency to increase the cerebral congestion. During the course of the bath, throbbing of the blood-vessels of the head may be allayed by the application of a cold wet turban; and palpitation of the heart, or oppression of breathing, may likewise be relieved by placing a cold wet towel over the chest, while, at the same time, cold water is freely sipped. After a short time the bather should proceed into the second room, and again, after a few minutes, into the third, and there recline until perspiration is freely established, when he should retrace his steps in reverse order, and pass the bulk of the hour or half hour he spends in the hot chamber in the first room. It is a mistake for the beginner to enter the fourth or hottest room at all until he is "seasoned," though old bathers prefer, and rightly, to proceed at once into either the third or fourth room, and remain until perspiration has commenced, returning to the first room to spend there the rest of the time. Should there be any difficulty or delay in starting the perspiration, the bather had better request the attendant to spray him with warm or hot water in the spray room, and it will be found on returning to the hot room that the skin begins to act freely. After being shampooed, soaped, and washed down, it is desirable to "finish" with a tepid, cool, or cold spray, or with a short swim through the moderately cold plunge bath, according as it is deemed best for the health of the bather, and as the temperature of the weather permits. He should then

proceed to the dressing apartment, and recline for at least half an hour, with the feet warmly wrapped up in a thick towel. In dressing, the hair ought to be thoroughly dried. During the sweating process in the hot room it is common to see bathers drowsy, and making efforts to resist sleep; and still more common is it to see a number of bathers sound asleep in the dressing room after the completion of the bath. Attendants engaged daily in the occupation of shampooing are good sleepers; indeed the writer never, in the prosecution of his inquiries, heard of one who was not.

The efficacy of the Turkish bath is greatly enhanced if it can be had just before going to bed, for the sleep which naturally follows its use is continued uninterruptedly during the night. This can only be accomplished, of course, by having the bath at home; and the writer can speak from personal experience, having used for some time in his own house the "Matlock Domestic Turkish Bath," invented by his friend Dr. Thomas Maccall, formerly assistant physician to Smedley's Institution, Matlock. It consists of a small chamber containing a couch for reclining on, with heating apparatus, and graduated taps for controlling the heat at will. Any temperature up to 200° Fahr. can be obtained quickly by simply regulating the quantity of gas used; and the heat may be as rapidly lowered, so that the one apartment combines the use of the three or four rooms usually met with in a public bath. The arrangements are of a simple kind, and are easily and safely controlled by the bather. The ventilation is perfect, the bath is quite portable, and occupies no more space in a room than an ordinary bed. It is so constructed that a small chamber can be added, fitted with cold and hot water, the latter heated from the same source as the bath, so that it forms in itself a complete Turkish bath.

Various substitutes for the Turkish bath are in use, but they all fall far short of the original in point of efficacy. Examples are to be found in the lamp bath, or in the old Malvern gas bath, which resemble each other closely. The bather sits upon a wooden chair, surrounded by several thick blankets securely fastened round his neck, a safety spirit lamp or gas arrangement is lighted underneath the chair, and perspiration soon commences. After it has continued for fifteen or twenty minutes he is released, takes a hot soap bath, and

finishes with a cold shower bath or cold sponging. A too frequent practice is the use of methylated spirit in a gallipot, without any wick or other precaution for safety. The lamented death of Dr. Carpenter, from an accident arising out of an arrangement of this kind, ought not to be without its warning.

Electricity.

This remedy, whether in the form of central galvanization or general faradization, is often attended by an improvement in the quantity of sleep. The writer has frequently noticed this in instances where it was used without reference to sleep at all, it being remarked by relatives and friends as a coincidence; and it is not surprising that it should be so, since Nothnagel demonstrated that cutaneous electrical stimulation was followed by reflex contraction of the vessels of the pia mater. Mr. Skene Keith, who has had a somewhat large experience of electricity in cases where its use was not adopted for the relief of wakefulness, has kindly summarized his observations on this subject for the writer. "During the treatment of fibroid tumors of the uterus, and of other pelvic conditions, by the passage of a continuous current of electricity from the abdomen to a sound placed in the uterine cavity, or *vice versâ*, one noticed that in quite a considerable number of cases sleep is affected. In perhaps rather more than half the cases there is not any change, but in the great majority of the remainder there is a marked improvement in this respect, and this before there has been sufficient relief of the symptoms to account for it. The patients often fall asleep in the afternoon after an application has been made, and will often sleep for ten hours at night. In a few cases the patients did not sleep so well as they did before." From this it follows that electricity has the power of lengthening the duration and deepening the intensity of sleep in some persons in whom it is not abnormal.

The writer has found it beneficial in about three-fourths of the patients who have used it for insomnia. In the majority, the improvement came slowly, and apparently as concomitant symptoms were alleviated; in a few, it came quickly; while in the remainder it came not at all, the remedy entirely failing to relieve the wakefulness. Reference has been made to this subject elsewhere.

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